COPY PROCESSING

Second Edition

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PREFACE

Copy Processing is an introduction to the world of reprographics for both students and office workers. For the student, it is an instructional guide in learning about reprographic methods. For secretaries and office workers, it is a reference manual in copy processing techniques and equipment. The techniques described include duplicating (ditto and mimeograph reproduction), printing (offset, letterpress, and other press operations), copying (photocopiers or copiers), and imaging devices (computers, word processors, printers, and other electronic equipment used to make copies).

This book explains the procedures in each of the various copy processing methods. It also evaluates the equipment in terms of its advantages and disadvantages, and gives advice on the best method for any particular job.

OBJECTIVES OF THIS BOOK

The first objective of this book is to make the reader aware of the uses of copy processing. Letters, reports, brochures, bulletins, business cards, and announcements are only a few of the information sources upon which businesses rely. All of these sources are prepared through copy processing. In-plant reproduction is becoming more and more common in medium and large companies. Small to medium companies often go to outside services for the majority of their copy processing needs. In either situation, those involved in producing the information must have knowledge of how to get it reproduced and distributed. Even when copy processing specialists do the actual work, the secretary or office worker should be able to talk knowledgeably to the specialist regarding the work. Without specific instructions on such matters as type style, type size, paper quality, and color, the final product may not be what the user wanted.

The second objective is to explain the techniques of copy preparation and reproduction. Preparation techniques include typography, typesetting, layout, pasteup, proofreading, and finishing. Reprographics methods range from the familiar stencil process and dry-process copier to the current multifaceted word processing systems and advanced technological methods.

The last objective of this book is to make students aware of the fact that there are job and career opportunities within the copy processing field. For example, reprographics departments are commonly found in large companies. In addition, the growth of local small reprographics businesses has been phenomenal in the last decade and the future is equally promising in this field.

USE OF THIS BOOK

Copy processing is an important subdivision within the information processing field. It should be an important element in any business curriculum. This text may be used for a copy processing course in a high school, college, or adult education class. Or it may be used as a supplementary text for a unit within a course. The book can also serve as a reference guide to anyone who needs to know about copy preparation and reproduction.

Part I

INTRODUCTION

1

THE WORLD OF PRINT

Objectives

After completing this chapter, you will be able to:

1. Briefly describe the history, current state, and future trends of paper and print.
2. Identify the topics involved in copy preparation.
3. List the five reproduction processes.
4. Name several imaging devices and integrated systems.
5. Name three decision-making considerations in the study of copy processing and reprographics.

A great teacher once viewed an innovation with great alarm. He said, "This invention of yours will produce forgetfulness in the minds of those who learn it, causing them to neglect their memory." The speaker was the Greek philosopher Socrates, and he was referring to writing!

In spite of Socrates' fear, writing became quite popular, and the population did not appear to lose its memory.

These misgivings were expressed again at the invention and growth of radio, and again some years later with television. Many experts expressed great fears that the population would become illiterate. Nevertheless, reading and writing are still practiced in modern society.

Today, some people fear that electronic technology will replace paper. In Washington, D.C., a so-called paperless office (designed by Micronet, Inc., an office-design consulting service) exists as a working model of the electronic office of the future.

Contrary to many beliefs, however, the world of print and paper is actually expanding. Modern technology has increased the paper flow to such an extent that many people write about how to control the paperwork explosion. One book, *Fat Paper: Diets for Trimming Paperwork,*[1] cleverly points out the abuses and misuses that modern copying and printing machines, computers, and word processors have brought about. The author's suggestion is not to eliminate the modern technologies but to learn the proper methods of controlling them.

PAPER AND PRINT, YESTERDAY AND TODAY

Paper was invented in China in 105 A.D.; however, the first printing of text on paper did not occur until 770 A.D., in Japan. The invention of movable type by Johann Gutenburg in 1450 is one of the most important events in human history. Paper and printing are essential in the world of today.

Paper

Up until a century ago, paper was considered merely a writing medium. The common envelope was unknown prior to 1841, the paper bag was not invented until 1849, corrugated board appeared in

1. Lee Grossman, *Fat Paper: Diets for Trimming Paperwork* (New York: McGraw-Hill, 1976.)

1841, and the paper cup made its debut in 1909.

During the last century, the paper industry's production has increased over 600 percent, with an accelerating upward trend. In addition, more waste paper is being recycled; presently about 30 percent of the nation's paper is being reclaimed. Current paper consumption amounts to well over a pound per day for every man, woman, and child in the United States. It is estimated that paper consumption is rising at the rate of 10 percent annually.

These trends hold for office paper as well as other paper products. Approximately 30 billion documents were generated in 1980. Paper is still the foremost communication medium when it comes to providing a permanent, immediately readable, and economical record. (See Figure 1-1.)

Print

Approximately 90 percent of the paper produced in this country has printing on it. More than 100 billion words are set in type each year in the United States. This represents about 10,000 times what an average person who did nothing but read all year would be able to read. It has been estimated that the number of words set per person in the United States has risen 16 percent in the last ten years.

The development of inexpensive computers makes it possible to bring the daily newspaper into people's homes on a display terminal (such as a television set). Yet most people sitting at the breakfast table still prefer to read the news from a printed newspaper rather than to read it from a television screen.

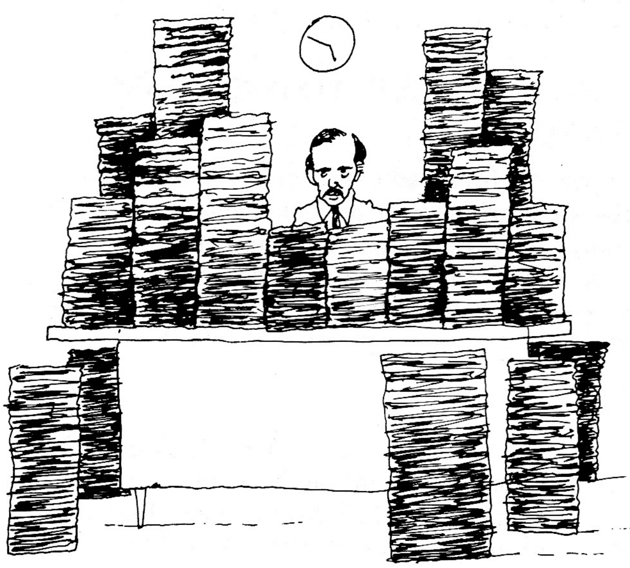


Figure 1-1

Nearly 70 percent of the words you read have passed through a computer at least once. Yet printing today does not differ much from its prototype in ancient China.

COPY PREPARATION

In a study of *copy processing,* or *reprographics,* the first subject to consider is copy preparation. Copy preparation is the process of putting words into a form that can be reproduced by machine. Copy preparation involves decisions about *paper; typography; typesetting; markup* and *proofreading; copyfitting, layout,* and *pasteup;* and various *finishing procedures.*

Paper

Selecting the right paper for a book, memo, letter, or report is extremely important. The characteristics of office paper, the different kinds of office paper, and the use of recycled paper are all topics you must consider. You will learn about paper selection in Chapter 2.

Typography

Type can be produced in many ways, including the typewriter, the word processor with an automatic printer, and phototypesetter. Every consumer using type needs some knowledge of *typography*—the method of choosing and arranging type—even though someone else may be responsible for the task of preparing the copy. In choosing type, a knowledge of type fundamentals, type classifications, type families, typesetting measurements, and the basic type terminology is needed. You will study typography in Chapter 3.

Typesetting

Since the invention of the typewriter by Christopher Sholes in 1868, typewritten copy has become a way of life. However, a trend is leading in the direction of copy that has been *typeset* (such as this book). Typeset copy looks better, is easier to read and understand, and can cost less in the long run than regular typewritten copy. Typesetting machines are now driven by electronic computer—a combination that is having a great impact on printing technology. Typesetting is described in Chapter 4.

Markup and Proofreading

Markup means marking a manuscript so that the typeset version will look exactly the way you want

it to. *Proofreading* involves reading the final version of the copy carefully before it is reproduced. In copy processing, an error is multiplied by the number of copies produced. Therefore, careful markup and proofreading are essential. You will learn these techniques in Chapter 5.

Copyfitting, Layout, and Pasteup

Arranging the copy to make a master for the reproduction process involves copyfitting, layout, and pasteup. Traditionally, these tasks were performed only by a graphic artist. Now, with the assistance of electronic media, almost anyone can handle these processes. You will learn more about the basic principles of design and the use of certain tools in Chapter 6.

Finishing Procedures

When producing copies by any reproduction, finishing procedures such as the color of paper and ink, the size of the publication, and the method of binding must be considered. Embossing, die-cutting, and shrink-wrap packaging are processes you should also be aware of. These subjects are discussed in Chapter 7.

REPRODUCTION PROCESSES

Reproduction processes can be put into five distinct categories. These processes can be called by various names, but the following are most common: *copiers, printing, carbon, fluid,* and *stencil.*

Copiers

Ever since the late 1950s, the general-purpose copier has been spreading into almost every office in the United States. Today, some 26 manufacturers in this country are producing more than 90 different models. Among them are Xerox, IBM, Savin, Canon, Royal, and Minolta.

Three basic factors account for the popularity of the copier. The first factor is *need.* In a typical business office, users want copies immediately and they usually want fewer than five copies of each original. The small-size, moderate-speed copier in several locations meets those needs perfectly.

The next factor is *reliability.* The copier is in general very reliable. Simplified mechanisms, improved optical and imaging processes, and new self-diagnostic systems all contribute to smaller and more compact copiers that require less maintenance.

The last factor is *price.* As performance and features on new models increase, so does their value per dollar. In other words, the cost is coming down, and the capabilities are going up. Copiers are described in detail in Chapter 8.

Printing

The five primary printing methods in use today are *letterpress, gravure, screen, engraving,* and *offset.* Some offices have small offset presses, and office workers might be required to operate them. Because such complex processes as letterpress, gravure, and screen printing are seldom used for office materials, the major emphasis in this book will be on offset printing.

Offset (also known as *lithography, offset printing, offset lithography, photo offset, photolithography, multilith, colitho,* and *multigraph*) is a method of duplicating large quantities of books, magazines, or reports—from several hundred to many thousands of copies. The quality of offset printing can be very high. Common uses of offset equipment include long runs of reports, bulletins, catalog pages, advertising brochures, and office forms.

In an effort to provide equipment which will produce professional results when operated by nonprofessionals, offset machine manufacturers are simplifying the equipment more and more. Many machines have operating controls that require little technical knowledge. As a result, running today's small offset presses requires less skill and much less knowledge than a journeyman printer would have.

There are three types of offset masters from which words, lines, and pictures may be reproduced in any color or in any quantity. One type of master is a smooth, paperlike material that is handled like an ordinary sheet of paper. The second type of master can be of metal (zinc or aluminum), paper, acetate, or foil. With the use of a special camera, a photograph is taken of the original material, and the resulting photographic negative is very similar to an ordinary black and white negative. The third type of master uses an *electrostatic* process to create an image. These masters may be used in general-purpose office copiers.

Offset printing and the different offset masters are described in more detail in Chapter 9.

Carbon Process

Carbon reproduction is a very old process. The first carbon paper was made in 1880. The carbon was an oily piece of paper covered with lampblack. It was messy, but it served a need and was relatively inexpensive. Business offices soon began to use it in increasing quantities.

Today, carbon can be used to produce from two to ten legible copies of a typed document. Most offices file at least one carbon copy of any correspondence sent or mailed from the office. Another typical use of carbon might be for a typed memo with separate copies sent to four staff members. Carbon reproduction is discussed in Chapter 10.

Fluid Process

The fluid process has many names. Because the paper actually touches the master on the duplicating machine, it is called *direct process.* Because a clear liquid is used, it is also called *liquid process.* Since the liquid is a chemical, the term *spirit process* is used. Its original name was *hectograph. Ditto* (a registered trademark) is such a popular make of spirit duplicating machine that many people refer to the fluid process as the *ditto process.*

Even though manufacturers claim that the fluid duplicating process can make from 300 to 500 copies, a more realistic estimate is 100 to 300 *legible* copies. Purple is the most common and most durable dye color used in fluid duplicating.

Schools and churches comprise the greatest market for this process. Fluid duplicators are used to produce copies of price lists, sales bulletins, accounting reports, engineering forms, maps, charts, and labels. The fluid process is described in Chapter 11.

Stencil Process

The stencil reproduction process is also called the *ink* process, or, more commonly, *mimeograph. Mimeograph* was originally a trademark of the A. B. Dick Company, but several other companies now use the term in referring to their machines.

Stencil equipment can be used for fairly long runs (several hundred to a thousand or more copies) of bulletins, catalog papers, and advertising material. A stencil is made, or cut, by typing or drawing on the fibrous wax-fill material which coats it. The basic ink is black. As in the case of the fluid process, schools and churches comprise the greatest market for the stencil method of reproduction. You will learn more about this process in Chapter 12.

IMAGING DEVICES AND INTEGRATED SYSTEMS

Copy processing, or *reprographics,* is the process of reproducing or duplicating documents or written materials. It also includes the operations of binding these materials. A related area includes equipment called *imaging devices* and *integrated systems.* This category includes word processing, communicating systems, OCRs (optical character readers), computer graphics, facsimile, intelligent copiers and printers, and micrographics. Such systems are covered in Chapters 13, 14, and 15.

DECISION-MAKING CONSIDERATIONS

One important aspect of copy processing and reprographics is decision making. The decision making concerns the selection of equipment, the placement of equipment, and safety precautions.

When selecting a piece of equipment or an entire system, a feasibility study may be needed. Such a study is important, regardless of the size of the company. In-plant reproduction or off-site reproduction should both be considered. If the feasibility study is positive, and the decision is to acquire the equipment or system, the next step is finding a vendor. After the equipment has been acquired, the equipment must be properly placed. Equipment may be centralized, decentralized, or customized.

Safety precautions, economy, waste, illegal copying, and cleanup are additional considerations. All these topics are discussed in Chapter 16.

REVIEW QUESTIONS

True/False

Directions: Write a "T" in each blank if the statement is true, and an "F" if the statement is false.

______ 1. Presently, about 70 percent of the nation's paper is being recycled.

______ 2. Paper is the foremost communication medium for producing permanent, immediately readable, and economical records.

______ 3. Nearly 70 percent of what is printed has passed through a computer in machine readable form at least once.

_______ 4. Because typesetting is such a difficult process, it is becoming less popular.

_______ 5. As copiers' capabilities increase, their cost per dollar is going down.

_______ 6. The offset press is commonly found in most small business offices.

_______ 7. The carbon process dates back to the early 1700s.

_______ 8. The fluid and stencil processes are primarily used in schools and churches.

_______ 9. Decision-making considerations are an important aspect of copy processing and reprographics.

_______ 10. Only large companies need consider doing a feasibility study.

Multiple Choice

Directions: In the blanks, write the letter of the choice that best completes each statement.

_______ 1. The paper industry's production is
a. rapidly increasing
b. slowly decreasing
c. stabilizing
d. rapidly decreasing

_______ 2. One topic that is *not* part of the copy preparation is
a. paper
b. typography
c. press operation
d. markup and proofreading

_______ 3. A process also known as the "direct process" or the "spirit process" is
a. fluid
b. stencil
c. carbon
d. gravure

_______ 4. The stencil process is also known as
a. hectograph
b. mimeograph
c. ditto
d. lexograph

_______ 5. The following is not a decision-making consideration:
a. economy and waste
b. illegal copying
c. safety precautions
d. All of the above are decision-making considerations.

SUGGESTED ACTIVITIES

a. Check the *Reader's Guide to Periodical Literature* in your library for articles concerning the current state and future trends of paper and print. Prepare an oral or written report on one aspect of this subject.

b. Check the facilities at your school to see what types of reproduction processes, imaging devices, and integrated systems are being used.

c. Prepare a brief oral or written report on the history of paper or printing.

Part II

COPY PREPARATION

2

PAPER FOR OFFICE USE

Objectives

After completing this chapter, you will be able to:

1. Explain two reasons for choosing paper carefully.
2. Describe the seven characteristics of office paper.
3. Demonstrate three ways of determining the front (or felt) side of paper.
4. Demonstrate three ways of determining the direction of paper grain.
5. List and describe the use of 9 of the 12 kinds of office paper.
6. Give examples of both high-grade and low-grade office waste for recycling.
7. List the steps in an office recycling program.

Paper is like a politician. Often a speaker is inspected and judged by an audience before the first word is uttered. Similarly, the feel and appearance of paper is usually evaluated before the first word printed on it is read. The paper on which type is printed represents approximately 30 to 50 percent of the final cost of the printed job. Thus, the selection of quality office paper is extremely important.

Legend has it that a Chinese emperor found writing on silk fabrics or on flat pieces of bamboo so irritatingly difficult that he ordered Ts'ai Lun, a court attendant, to undertake the invention of a new writing medium. Apparently Ts'ai Lun did as he was commanded, for he produced, around 105 A.D., a material made of the beaten fibers of the inner bark of the mulberry tree. When matted together, the fibers formed a white sheet which later became known as paper.

Techniques and materials have changed, but the principles of papermaking have remained unaltered.[1]

Most paper is made from cellulose, the primary substance found in the cell walls of trees and plants. The cellulose fibers are held together by a kind of natural glue called lignin.

To make paper such as this book is printed on, wood is first cut into chips. The lignin is then removed from the cellulose fibers, and the fibers are mixed with water to form a pulp. Pumps spray the pulp onto a large moving screen in the papermaking machine. Most of the water in the pulp drains through the screen, leaving an even mat of fibers. This mat passes through a series of rollers that remove the rest of the water and press the fibers together. The result is paper.

CHARACTERISTICS OF OFFICE PAPER

A researcher recently compiled a list of more than 3,000 different uses for paper. Obviously, such variety of uses calls for a great variety of specialized manufacturing processes.

Natural variations in plant cellulose, together with the different chemicals and minerals used during production, determine the characteristics of finished paper.

1. Additional information on paper and printing can be found in *Pocket Pal,* available from International Paper Co., 220 East 42nd Street, New York, NY 10017.

Finish

Finish refers to the surface of a piece of paper. Paper may be rough or smooth, glossy or dull, hard or soft. The various finishes commonly seen are produced during manufacturing and during the later operations of *rolling, smoothing,* and *embossing.* In selecting papers for ordinary office use, the prime consideration should be utility. Selection must be based on the paper's practical use in clerical operations rather than upon its technical perfection or beauty of finish. However, the paper for prestige items, such as high-grade letterheads, should be chosen carefully to convey the desired impression upon recipients.

Paper has both a *front* (or *felt*) side and a *back* (or *wire*) side. The front side gives the best typing and duplicating results. Ways to determine which side is the front or felt side are:

1. Read the watermark right side up.
2. Read the label on the package. Paper is usually packaged so that it is lying front side up as the label is read.
3. Scratch the surface with a silver coin. A silver coin will usually make a mark on the front side of the paper.

Opacity

Opacity—the degree to which printing or writing on one side of a sheet will show through to the other side—is an important factor in selecting paper for a specific purpose. It is not possible to see through a completely opaque substance, such as heavy cardboard. The degree of opacity of different papers varies considerably. Nonopaque originals cannot be successfully duplicated in many cases.

Opacity is determined by the weight or thickness of the paper, the finish, the amount and kind of filler added to the pulp, and the amount of "sizing" used to bind together the paper fibers.

Size

Paper is packaged in *reams* of 500 sheets. Sheets come in several different sizes (see Figure 2-1). *Standard-* or *letter-*size paper is 8½ inches wide by 11 inches long. For shorter notes or memoranda, half-size paper (5½ by 8½) is also used; the paper may be turned in either direction. *Legal-*size paper, which measures either 8½ by 13 inches or 8½ by 14 inches, is used for many business papers and forms. Government letters are frequently typed on *official-*size paper (8 by 10½ inches). Many executives prefer to use *monarch-*size (7¼ by 10½ inches) or *baronial-*size (5½ by 8½ inches) stationery for less formal business letters.

Paper Sizes

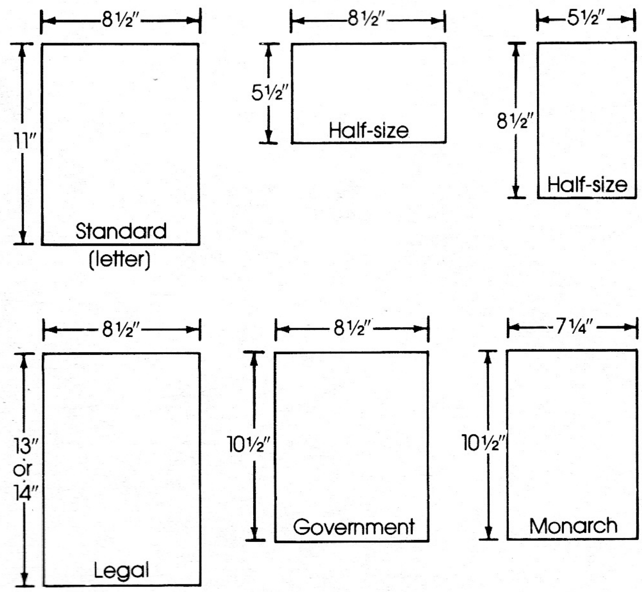


Figure 2-1

Substance

Almost all office papers are identified by their *substance* or *basis weight.* This is the weight of one ream of the paper before it is cut during the manufacturing process. For example, a standard-size paper is manufactured in sheets measuring 17 by 22 inches. Five hundred sheets of this size might weigh 20 pounds. The paper is then cut into four equal parts measuring 8½ by 11 inches, producing four reams of standard-size paper (Figure 2-2). Thus, each ream would actually weigh 5 pounds—not 20 pounds. However, each of these four reams would be identified "Substance 20," and this identification would be marked on its package (Figure 2-3). The higher the substance number, the thicker the paper.

Bond papers, used for letterheads and other business forms, come in weights of 9, 13, 16, 20, and 24 pound. Mimeograph and duplicating papers come in weights of 16, 20, and 24 pound. Onionskin, manifold, and tissue papers generally are made in only one weight, 9 pound.

Caliper

Caliper is the thickness of a single sheet of paper measured under controlled standard conditions and expressed in thousandths of an inch or in points. A paper having a caliper of .005 inch is said

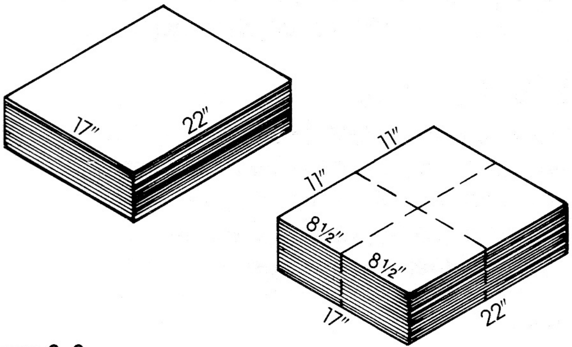


Figure 2-2

Dual-Purpose White

For superior results with xerography and offset.
500 Sheets, 8½ x 11 (216 m m x 279 m m)
• Substance 20 (75 g/m²) • Grain Long

Figure 2-3

to be caliper 5 points. A *point,* used in describing paper thickness, is equal to .001 (1/1000) inch.

Grain

Paper grain is the direction in which the fibers run. Grain affects paper in the following ways:

1. Paper folded *with* the grain direction results in a smoother and longer-lasting fold. The paper makes rough folds or cracks when it is folded *cross-grain.*
2. Paper is stiffer in the grain direction. This is the direction in which paper should be fed into duplicating machines.
3. Paper expands or contracts more in the cross-grain direction when exposed to moisture. In books and catalogs, grain direction should be parallel with the binding edge; otherwise, the pages turn less easily and do not lie flat.

To determine the direction of the grain, follow one or more of these steps (see Figure 2-4):

1. Tear the paper; it will tear smoothly *with* the grain.
2. Tear a corner from the paper and moisten it; the paper will curl *with* the grain.
3. Fold the paper; the *smoother* fold indicates the grain.
4. Hold two strips together between thumb and forefinger. The one that bends the *least* has its grain running in its longer dimension.

Erasures should be made *with* the grain of the paper, because erasing against the grain roughens the paper. In making erasures, the typist should experiment with the quality of paper being used. The most difficult papers on which to make neat erasures and corrections are the inexpensive ones, such as newsprint and all sulfite-based papers. Some papers are specially treated so that ribbon or carbon typing is extremely easy to erase. However, the print is also easily smeared, and these papers are not suitable for office work. The typist should also experiment with the type of eraser to be used. Some types of bond paper require an eraser with less abrasive material than others (see Figure 2-5).

Permanence and Durability

Permanence is the ability of paper to resist deterioration under various conditions of storage. *Durability* is the ability of paper to withstand active use, such as handling, erasing, and folding. A highly durable paper is also likely to be relatively

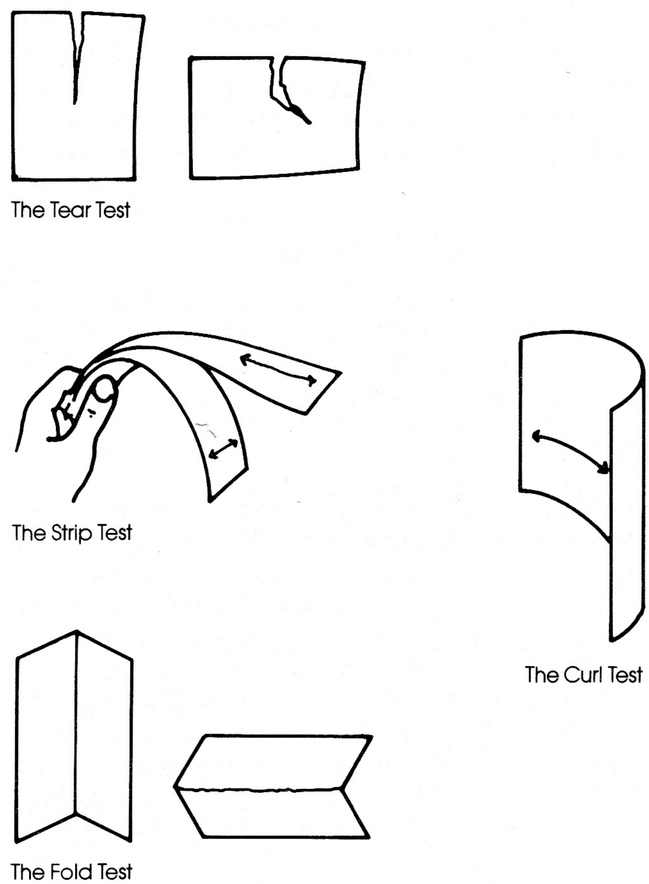


Figure 2-4

Various Types of Erasers

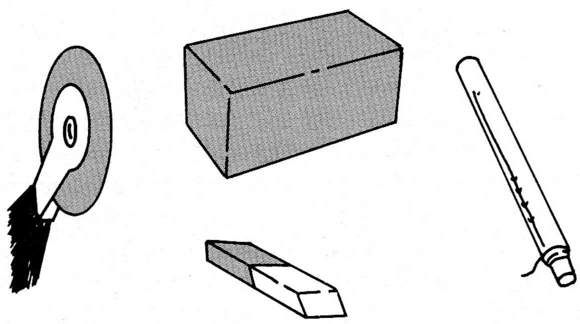


Figure 2-5

permanent. Both durability and permanence depend upon the nature of the fibers used in the paper, the treatment to which the pulp is subjected during manufacturing, the degree to which residual chemicals are removed after they have served their purpose in manufacturing, and the conditions under which the paper is stored. Papers which are to be saved for many years should contain little sulfite and much rag. The label on the package should state the percentage of the *rag* (or *cotton*) content.

KINDS OF OFFICE PAPER

Office paper is classified into various groups. Some of the common classifications are *bond, ledger, bristol, duplicating bond, mimeo bond, onionskin, carbon, NCR, manila, tag, vellum,* and *photocopy.*

Bond

Bond paper is so called because originally it was used for printing bonds, legal documents that had to last a long time. Bond papers are still used for this purpose, although the name now includes a wide variety of papers used mostly for commercial printing of letterheads and office forms.

Bond paper is used for the original when making carbon copies. Quality bond paper contains a *watermark,* words or design which can be seen by holding a sheet up to the light. Since only better bonds are watermarked, the mark indicates quality. (Some large corporations imprint their trademark as a watermark on their bond-paper stationery.) Bond paper used for originals can vary from 12 to 24 pound, but 16 and 20 pound are the most common weight. If a great number of copies is being made, it would be better to use a lighter bond paper in order to get clear carbon copies.

Ledger

Ledger paper is almost the same as bond, but it is made in a range of heavier weights and with a slightly different finish. Ledger paper is used chiefly for bookkeeping purposes in either pen-and-ink or machine processes.

Bristol

Bristol papers were first made in Bristol, England. Bristol board is thicker than the papers in the bond and ledger families. *Index bristol* has a smooth finish which is suitable for either pen or typewriter. It is used for index cards. *Bogus bristol* is a grade cheaper than index bristol and is usually made from waste paper stock. It is usually colored only on the outside surface and is used for temporary items such as tickets. *Wedding bristol* is the highest quality bristol board and is used for the printing and engraving of announcements, cards, and similar items. Frequently, wedding bristol is made in fancy finishes or with embossed panels.

Duplicating Bonds

Duplicating bonds are made for use with various fluid duplicators. One type of paper is used for the master, and another type for the reproduced copies. This paper has a smooth surface and is made to control the quantity of dye transferred during the reproduction process.

Duplicating bond papers with substances from 16 pound up to card stock—as heavy as 110 pound can be used on most fluid duplicators. Heavy stock can be fed into the machine by hand, one piece at a time, if necessary. Paper used for the fluid duplicating process must have a slick, smooth surface in order to take ink well. Because of these characteristics, which make it difficult to erase and correct, duplicating bond is not a good substitute for regular bond paper for original typewriter work.

Mimeo-Bond

Mimeo-bond paper, also called *mimeo* or *mimeograph* paper, has a coarse texture and is highly absorbent. In selecting a mimeo-bond, its absorbing quality must be considered. Too much absorbency causes ink wastage, while too little can result in offsetting, smudging, or smearing. The most common substances of mimeograph paper are 16-, 20-, 24-, and 28-pound paper. If copy is to be run on both

the front and back of a sheet of paper, 24- or 28-pound paper should be used to prevent the printing from showing through.

The three common sizes of card stock (3 by 5 inches, 4 by 6 inches, and 5 by 8 inches) can be used on the mimeograph. Some ink duplicators will not take a 3- by 5-inch card unless the cards are run the long way. Too heavy a card stock, particularly with small-size cards, may be impossible to run through many ink duplicators; however, weights up to 90- or 110-pound stock can be run.

Onionskin

Onionskin, manifold, and *tissue* are thin, lightweight bond papers used for file copies of correspondence and forms. Such paper is available in various colors and is normally of 9-pound substance, but a heavier bond paper might be better for carbon copies that will be circulated rather than filed. Three finishes are available:

1. *Glazed* For use making many carbon copies. It does not take up nearly as much file space as other types.
2. *Smooth* For making copies in large quantity of high quality.
3. *Cockle* For making only a few copies, when a more dignified or attractive paper is necessary.

Carbon

Most kinds of *carbon* paper are coated with a carbon-black compound mixed with a wax base. Color, weight or substance, and finish are three factors to consider in choosing a carbon paper. The most commonly used color is black. Blue is used extensively for pencil carbon work, and red is used for contrast or emphasis.

Film or *mylar carbon* is a microscopically thin sponge of mylar that has absorbed liquid ink. As the typewriter key strikes this sponge, the force of the impact squeezes some of the ink onto the paper. This type of carbon typing is smudge-free and curl-free. The carbon costs approximately 10 cents a sheet, but it can be used almost indefinitely.

The substance of carbon paper varies. A lighter weight carbon paper will give sharper copies and will make more copies than a heavier carbon. However, heavier carbon paper is usually preferred because of its greater ease of handling and better durability. The chart below can be used as a guideline in selecting carbon paper with proper weight for a particular job.

COPIES	PAPER CARBON	FILM (MYLAR)
1–4	7 pound	1 mil (1/1000 inch) (standard)
5–9	5 pound	1/2 mil (light)
10+	4 pound	1/2 mil (light)

The *finish* on carbon paper refers to the density of the coating or ink or carbon on the sheet. A *hard-finish* paper has a thinner coating, or is a lower-density paper, than a *soft-finish* paper. The carbon on hard-finish papers does not spread on the copies as readily as soft carbon. A hard-finish carbon paper is best for use with an electric typewriter. A soft-finish paper is better with a portable or manual typewriter, since it compensates for the lighter impact and unevenness of the type keys.

Carbon paper comes with *processed* and *non-processed* backs. The processed back has a wax tissue to prevent curling, and is a better buy.

Carbon papers with special features are available. Two of these features are diagonal-cut corners (helpful in holding the corners of the original and copies while removing carbons) and extensions on the sides with numbered lines (helpful in determining how near the typist is to the bottom of the page). Most carbon paper is actually 8½ by 11½ inches—a half-inch longer than standard-size paper—to allow easy separation and removal.

NCR

A method of treating paper so that multiple copies of business letters and forms can be made without carbon paper was developed several years ago by the National Cash Register Company. The system (called NCR for "*No Carbon Required*") uses a colorless chemical coating on the underside of each of one or more precollated top sheets of paper. The impact of the typewriter key—or the pressure of a pencil or ball-point pen—on the top sheet drives this chemical into contact with a coating on the face of the second sheet. The mixing of these coatings causes a chemical reaction that leaves a sharp blue impression on the second sheet. Since smudging is eliminated and carbon inserts are not required, the handling of forms is simple and efficient. NCR paper should not be used for legal documents, for it has a tendency to "bleed" or run if water gets on it. Many photocopy machines are unable to copy the blue markings on the carbon copy. Normally, because NCR paper requires more pressure than ordinary carbon paper to reproduce well, no more than two or three copies are made at one time.

Manila

Manila paper can be made from a variety of stocks, but it is all tough, heavy, and brownish-yellow in color. Manila papers are used for file folders, heavy envelopes, wrapping and packing papers, and other stiff paper items.

Tag

Tag board is somewhat similar to manila but is made with a higher finish to give it a good writing surface. It is used for making shipping and identification tags, newsprint, kraft wrapping paper, and other coarse or industrial papers.

Vellum

Vellum is a fine parchment paper used for certificates, diplomas, charters, wills, and other important writings. Vellum is also used by graphic artists and for originals in the diazo process of photocopying.

Photocopy

The correct paper for use in the photocopy process depends upon the particular machine used. Some machines require a special, coated paper. However, many of the machines today can reproduce on any of the bond papers.

The following table summarizes the different types, characteristics, and uses of common office papers.

RECYCLED PAPER

Recycled paper is waste paper that has been reclaimed and used to produce new products. High grades of office waste paper can be used as a substitute for woodpulp in the papermaking process. Computer printouts and manila tab cards may sell from $180 to $270 per ton depending on market conditions and geographic location. In addition to the revenues from the sale of paper, offices can often reduce their disposal costs, since the paper is no longer treated as trash to be hauled away.

KINDS OF OFFICE PAPER

TYPE	CHARACTERISTICS	USES
Bond	9, 13, 16, 20, 24 lb.; usually watermarked	Originals
Ledger	24, 28, 32, 36 lb.; thicker than bond	Bookkeeping
Bristol	Thicker than ledger	
Index	Smooth finish	Index cards
Bogus	Cheaper grade, colored only on outside surface	Tickets
Wedding	Highest quality bristol	Printed or engraved announcements or business cards
Duplicating bonds	16, 20, 24, 28 lb.; smooth surface	For use with fluid duplicators
Mimeo	16, 20, 24, 28 lb. to card stock; coarse texture, highly absorbent	For use with mimeographs
Onionskin	9 lb. available glazed, smooth or cockle	Carbon copies
Carbon paper	Coated with carbon-black compound, available in black, blue, and red	Black for typewritten copies; blue for pencil or pen work; red for contrast or emphasis
Film or Mylar Carbon	Available in three weights	Typewritten copies
NCR	Carbonless copies; uses chemical coating	Business letters, forms
Manila	Cheap, tough paper	File folders, heavy envelopes, wrapping and packing paper
Tag	Higher finish, good writing surface	Shipping and identification tags, newsprint, kraft wrappings
Vellum	Fine parchment	Certificates, diplomas, charters, wills
Photocopy	Plain paper or coated paper, depending on photocopier	For use with photocopiers

Quality

The best way to begin the recycling process is to ask employees to sort waste at their desks. Office waste can usually be broken into two categories—high-grade and low-grade.

High-grade (desirable) white wastepaper consists of the following: stationery, scratch paper, ruled pads (without cardboard backing), photocopy (xerographic) paper, information bulletins, outdated practices and general letters, old reference materials (without covers), computer printouts (without binders), index and tabulating cards, and white envelopes (without plastic or cellophane windows).

Low-grade (undesirable) waste consists of the following: colored paper, magazines and newspapers, cardboard, carbon and other sensitized paper, metal objects such as paper clips, foil, spiral binders, and fasteners, cellophane, and junk items (cups, lunch bags, wax paper, smoking materials).

Steps

Before beginning a recycling program, locate a broker or dealer. (The Yellow Pages under "Wastepaper" is a good source of names.) The next steps in an office recycling program are:

1. Announce the program to employees.
2. Devise a system for separating high-grade and low-grade wastepaper at the desk.
3. Schedule regular pickups.
4. Weigh materials from different departments.
5. Publicize the success of the program by posting results.
6. Give an award to departments for their efforts in the program.

REVIEW QUESTIONS

True/False

Directions: Write a "T" in each blank if the statement is true, and an "F" if the statement is false.

_______ 1. The paper on which an image is printed represents approximately 5–10 percent of the final cost of the printed job.

_______ 2. The feel and appearance of paper is usually evaluated before the first word printed on it is read.

_______ 3. Vellum is the type of paper used in manufacturing index cards or business cards.

_______ 4. Tag board, similar to manila, has a higher finish which makes it a better writing surface.

_______ 5. Colored paper, magazine paper, and newspaper are considered high-grade waste paper.

Matching

Directions: In each blank write the letter of the term that matches its description.

_______ 1. a paper's surface characteristics

_______ 2. the front side of paper

_______ 3. the backside of the paper

_______ 4. the degree to which printing on one side will show through to the other side

_______ 5. 500 sheets of paper

_______ 6. the weight of one ream of paper before cutting during the manufacturing process; basis weight

_______ 7. paper used for letterheads and other business forms

a. bond
b. durability
c. felt side
d. finish
e. grain
f. opacity
g. permanence
h. ream

_______	8.	the direction in which the fibers of the paper run	i.	substance
_______	9.	the ability of paper to resist deterioration under various conditions of storage	j.	wire side
_______	10.	the ability of paper to withstand conditions imposed through usage; such as handling, erasing, and folding		

SUGGESTED ACTIVITIES

a. Demonstrate the various tests for:
   1. Finding the right or wrong side of paper.
   2. Determining the grain of paper.

b. Collect samples of the various kinds of paper listed in the table on page 16.

c. Visit a stationery store, a paper wholesaling house, a paper factory, or a recycling plant. Prepare an oral or written report on what you learn.

3
TYPOGRAPHY

Objectives

After completing this chapter, you will be able to:

1. Name the typeface sizes available on regular typewriters or text editors.
2. Describe three methods of impression other than typebars.
3. Explain proportional spacing and its advantages.
4. List and explain several methods of obtaining special effects with regular type.
5. Explain the measurements of points and picas.
6. Define line space or leading.
7. Explain the function of letterspacing.
8. List five different types of arrangements for typeset material and give an example of where each might be used appropriately.

Typography is the art of producing words and symbols from type. The word *type* refers to the individual letters, numbers, and symbols that make up the words you see on a printed page or in other visual media (slides, overhead transparencies, or video-display screens). The precise layout of words on a page or other medium and the design of different typefaces are also a part of typography.

The entire appearance of a printed document can be affected by the selection of typefaces. Many characteristics—formality, informality, boldness, lightness—can be suggested or emphasized by the typeface used (see Figure 3-1). The most widely used typefaces come in families. A family of faces consists of a roman version (like this), a **boldface** version (like this), and an *italic* version (like this). Condensed and expanded faces may also be available. Each face is available in many sizes. A single typeface in a single size is called a *font.*

Special faces that include mathematical and technical symbols are made for mathematicians, engineers, chemists, and doctors. Foreign language faces provide letters, marks, and symbols not found in the English language. Typefaces are even available for typing Braille or to be read by machines. Condensed faces are very useful for parts lists and directories. Faces are designed to attract attention, entice a reader into text copy, or create specific feelings and moods.

Delicate

Formal

narrow

SMALL

BOLD

Figure 3-1

Readability is measured
by how easily copy can be read.

Legibility refers to
how easily one character can be
distinguished from another.

Figure 3–2

Readability is measured by how easily copy can be read. *Legibility* refers to how easily one character can be distinguished from another. Both are important factors in printed communications (Figure 3-2).

TYPEWRITERS AND TEXT EDITORS

Most electric typewriters and word processing text editors use an interchangeable element or print wheel, allowing the material to be printed in a variety of different typefaces or styles.

Typeface Sizes

On typewriters, the common sizes of typefaces are *pica,* with 10 units per inch, and *elite,* with 12 units per inch (Figure 3-3). In addition, typewriter type may also be obtained in sizes of 6, 8, 9, 11, 14, and 16 characters per inch. The number of characters in an inch is frequently referred to as *type pitch,* for example, 10 pitch or 12 pitch. Typefaces as large as an inch are available for use in typing display cards, notes for speakers, messages on teleprompters, or similar purposes. *Primary typewriters* having a large typeface are useful for teachers of the lower elementary grades in preparing typewritten copy for their students. In duplicating work, the primary typewriter can be used for main headings and other items where special emphasis is desired (Figure 3-4).

Although most typewriters employ the standard 6 vertical lines to the inch, the line spacing can vary from 1 line per inch to 8 or more lines per inch. Type styles that use 3, 3.6, 4, 4.5, 5.8, 6, or 8 lines to the vertical inch can be obtained. Although single, double, and triple spacing are standard on most typewriters, machines with settings for line spacings of 1, 1½, 2, 2½, and 3 lines give greater flexibility in adjusting the spacing of the typewriter to the line spacing on printed forms (Figure 3-5).

Carriage lengths vary from 11 to 27 inches. The 13-inch carriage is most commonly used. Some machines have interchangeable carriages, so that the standard carriage can be removed and an extra-long unit set in its place for special projects such as charts, graphs, tables, special displays, or stencils placed long side up in the typewriter.

eeeeeeeeee
1″
Pica — 10 characters per inch

eeeeeeeeeeee
1″
Elite — 12 characters per inch

Figure 3–3

Primary type is useful for headings

Figure 3–4

1″ e e e e e e — 6 lines per inch

Single Spaced
XXXXXX
XXXXXX

Double Spaced
XXXXXX

XXXXXX

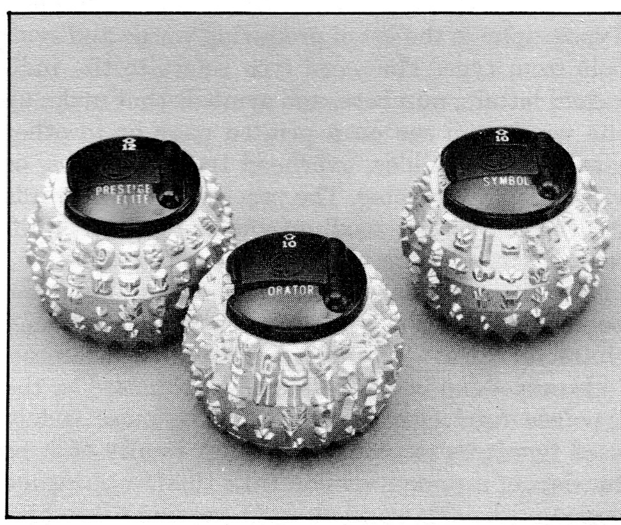
Triple Spaced
XXXXXX

XXXXXX

Figure 3–5

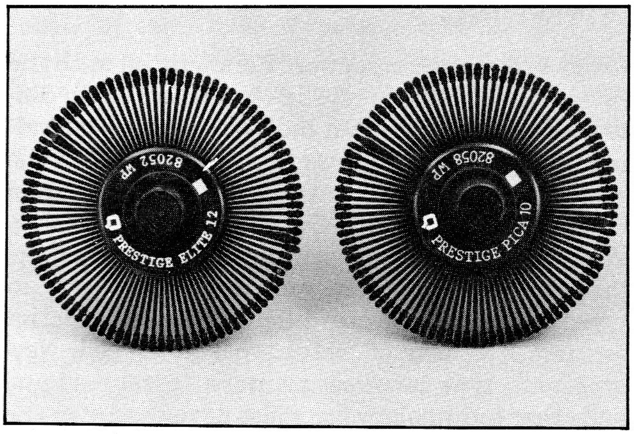
Changeable Elements and Print Wheels

In 1961, IBM Corporation introduced the Selectric typewriter. This machine revolutionized typewriter design by eliminating the typebars and the movable carriage. On the Selectric's carriage, a spherical *element* the size of a golf ball moves from left to right across the paper (Figure 3-6). The alphabet and special symbols are raised on the sur-



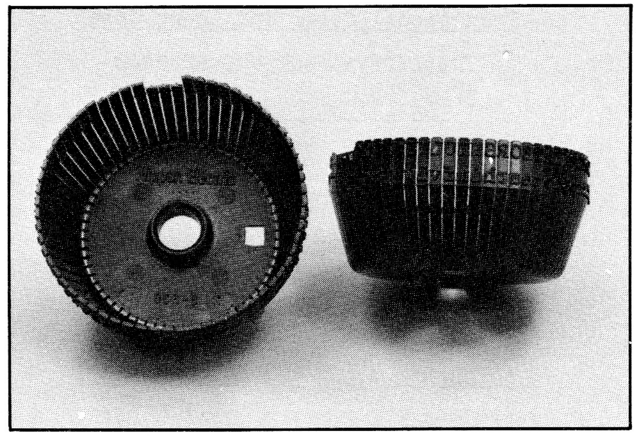
Eastman Office Supplies

Figure 3–6a DSG spherical typewriter element.



Eastman Office Supplies

Figure 3–6b Diablo printwheel.



Eastman Office Supplies

Figure 3–6c NEC thimble printer.

face of the sphere. When a key is struck, the element positions the letter or symbol for impression. One of the distinctive features of the Selectric is that it permits the use of a wide variety of type styles and special symbols. A number of type elements can be purchased, each element having a different type style or set of symbols. To change type styles, the operator removes one element and replaces it with another. This process is referred to as *interchanging the font or element.* The changeover can be accomplished in a few seconds; thus, a variety of typefaces can be used on the same page of copy without removing the page from the machine.

In 1974, the Diablo Company developed a plastic print wheel; it is called the *daisy wheel printer* because it resembles a daisy (Figure 3-6b). The print wheel rotates in a vertical position until it arrives at the selected characters, then a hammer hits the character against the paper to print. The Qume Company later developed a metal print wheel. Recently, NEC Information Systems developed a printing mechanism called the NEC Spinwriter, or so-called *thimble* (Figure 3-6c). A thimble-type printer can print in two, and as many as ten, languages in the same print run.

Different typefaces can be obtained by removing one print wheel and interchanging it with another. Many text editors have print wheels that print *bidirectionally,* that is, the printing device moves from left to right on the page and then continues printing on the next line from right to left. Print wheel devices offer increased output speed over the typebar or element machines. For this reason, most text editors are currently using some form of a print wheel. Output speeds of 30, 40, 45, or 55 characters per second (350, 480, 500, or 650 words per minute) are possible, along with a variety of typefaces. Some word processing printers contain two print wheels, permitting interchangeable type without removing a print wheel.

Proportional Spacing

The ordinary typewriter uses the same space for each letter, number, or punctuation mark. Printing, however, uses *proportional spacing;* that is, some letters are wider and use two or three times the space of other letters (Figure 3-7). The IBM Executive model was the first typewriter that provided proportional spacing. Today, many text editors offer this advantage.

Material produced on a typewriter or printer using proportional spacing closely resembles printing in appearance. Space is calculated on the basis of *units.* Each letter, number, or symbol is 2, 3, 4, or 5 units wide. Proportional spacing makes it possible to space words much more evenly when *justifying* (lining up) right margins.

Special Effects with Regular Typing

Special effects and emphasis can be created using capitals or small letters, underscoring, spacing between letters, spacing between words, and spacing between lines. Such variations can be used on title

Standard or Uniform Spacing	Proportional Spacing
iiiii	iiiii
ooooo	ooooo
wwwww	wwwww
mmmmm	mmmmm
WWWWW	WWWWW

Figure 3–7

Traditional Upper and Lower Case

TRADITIONAL NOT UNDERSCORED

TRADITIONAL UNDERSCORED

TWO SPACES BETWEEN WORDS

THREE   SPACES   BETWEEN   WORDS

Traditional Upper and Lower Case

with Spaces Between Words

A l t e r n a t e l y   S p a c e d

A L T E R N A T E L Y   S P A C E D

A L T E R N A T E L Y   S P A C E D

Figure 3–8

pages, announcements, or any other copy needing special emphasis, or *display.*

Spread centering is one simple, attention-getting technique for a heading. The typist simply spaces out the capital letters L I K E T H I S. One space is inserted between letters, and three spaces between words (Figure 3-8).

Straight right-hand margins can be created by justifying the copy on a regular typewriter. *To justify* means to have all typed lines end at the same point (except for the short final lines of paragraphs) at the left and right margins. When the right margin has been determined, each justified line will reach exactly to this end point. Copy to be justified must be typed twice (Figure 3-9). Notice that the lines are justified by adding spaces between words. Similar steps can be taken for margin justification on the Executive typewriter. Detailed steps are given in the operating instructions of typing manuals supplied by the sales representatives of various typewriter companies.

Set the margins for the length
of writing line desired. Type a/
rough of the copy using diagonal/
marks to complete the line. It is
better to fall short of the right
margin--rather than long. Go over
the copy with a pencil, filling//
each line with as many check marks
as you have diagonals. If you///
type beyond the margin, squeeze//
letters together in order to gain
the space or spaces needed. Dis-
tribute any extra spaces so that/
no large gaps appear. Then re-//
type the material.

Set the margins for the length
of writing line desired.   Type a
rough of the copy using diagonal
marks to complete the line. It is
better to fall short of the right
margin--rather than long. Go over
the copy with a pencil, filling
each line with as many check marks
as you have diagonals.   If you
type beyond the margin, squeeze
letters together in order to gain
the space or spaces needed. Dis-
tribute any extra spaces so that
no large gaps appear.   Then re-
type the material.

Figure 3–9

TYPESETTING

Books and manuscripts were handwritten until the invention of movable type in the mid-fifteenth century. Each writer had an individual style for forming letters. This style was greatly influenced by the area in which the person lived, ranging from Chinese calligraphy to German Gothic lettering. With the invention of printing by movable type, the handwritten letters were copied and cast in type. Since there were different styles of script writing, a variety of metal types developed. New typefaces, type families, printer's measurements, and other terminology have also developed over the years.

Type Fundamentals

Capital letters are called *uppercase* and small letters are called *lowercase.* (These terms derived from the early days of printing when capital letters were kept in the uppercase, or drawer, and the small letters in the case below.) In lowercase letters, the upper stroke is called the *ascender,* and the downward stroke the *descender* (Figure 3-10). The short crossline at the end of each main stroke is called the *serif.* Serifs originated with the Roman masons who terminated each stroke in a slab of stone with a serif to correct the uneven appearance

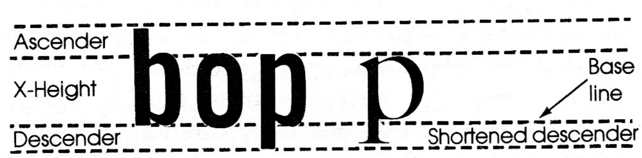


Figure 3–10

made by their tools. Typefaces without serifs are called *sans serif* (Figure 3-11). The *body,* or *x-height,* makes up the greatest portion of a letter. It refers to lowercase letters only, and is equal to the height of the lowercase x.

Typeface Classifications

About 30,000 typefaces exist in the print world today. Most of these typestyles can be divided into two classifications: with serifs and without serifs (sans serif). Seven main groups of typestyles are presented below (Figure 3-12).

Oldstyle

Oldstyle typefaces were patterned after the letters used on classical Roman inscriptions. The letters have high readability because they are open, wide, and round, with pointed serifs that make a pleasing contrast between the heavy and light strokes.

Modern

The term *modern* refers not to a time period, but to a style of type designed almost 200 years ago. These types have a greater degree of mechanical perfection than Oldstyle faces and are distinguished by the extreme contrast between thick and thin strokes. The letters have thin, squared-off serifs.

Square Serif

The *square serif* is a contemporary typestyle used mainly for display, headlines, and small amounts of reading matter. The letters have square or blocked serifs and more or less uniform strokes. The face is even in texture and weight, with very little contrast.

Sans Serif

Sans serif type is quite popular for signs and advertising because of its simplicity of design. The letters have no serifs, and the face is generally even in overall weight, with very little contrast between thick and thin strokes.

Script

Script is designed to simulate handwriting and is used mostly for special effects, formal invitations, and announcements. There are no serifs or extreme contrast between the thick and thin strokes, and the letters seem to touch each other.

Text Letters

Text letters resemble the hand-drawn letters of the early scribes. They are usually selected for religious documents, certificates, diplomas, or invitations.

Serif

Sans-Serif

Figure 3-11

This is Oldstyle roman.
This is modern.
This is a square serif.
This is a sans serif.
This is script.
This is formal text.
This is decorative type.

Figure 3-12

Decorative Types

Novelty styles or faces are used primarily to command attention. They are generally contemporary faces and do not fit any of the standard classifications. Designed to express different moods, they may be eccentric in appearance.

Type Families

A *type family* consists of a number of typefaces that show a marked resemblance but have individual design variations in weight, proportion, angle, and surface texture. Even though members of a typeface family are varied and diverse, they all maintain the basic characteristics of the parent design (Figure 3-13).

Weight

Typestyles can range from very light to extremely heavy stroke widths and still maintain family design traits. Stroke weight is classified as *extra light, light, semi-light, medium, semibold, bold, extra bold,* and *ultrabold.*

Weight	A Light	**A** Bold	**A** Extrabold
Proportion	A Condensed	A Normal	A Expanded
Angle	*ABCD* Italic		A Decorative Surface Texture

Figure 3-13

Proportion

Typestyles can be *condensed* or proportionally *expanded* from the parent design. Standard proportional increments are *ultra condensed, extra condensed, condensed, normal, expanded, extra expanded,* and *ultra expanded.*

Angle

A slanted typeface is called *italic.* The variation includes both letters that are simply slanted and those that resemble handwriting. Italics based on classic handwriting are generally called *cursives* and almost have the appearance of script.

Surface Texture

Surface texture is another variant within a type family. There are *outline, three-dimensional, incised, stenciled, textured,* and *reverse* typefaces.

Typesetting Measurements

Type sizes and the measurements used in typesetting are expressed in a uniform system of measurements. Because the units in this system are extremely small, it is possible to specify the size and appearance of type with great precision.

Points and Picas

Points and *picas* are the two standard units of measure used in typesetting and copy arrangement. A *point* equals 1/72 of an inch. A pica equals 12 points, or 1/6 of an inch (see Figures 3-14 and 3-15).

Type size is measured in points. A 10-point typeface (for example, the face used in this book) measures 10 points from the top of the highest ascender (the letters "h" or "l") to the end of the lowest descender (the letters "p" or "y"). The individual letters are shorter than this 10-point area, so that there is white space between the lines of type. Capital letters and small letters such as "a," "n," and "x," sit on the base line of the line of type.

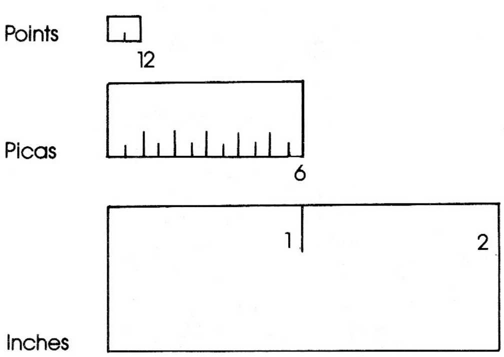


Figure 3–14

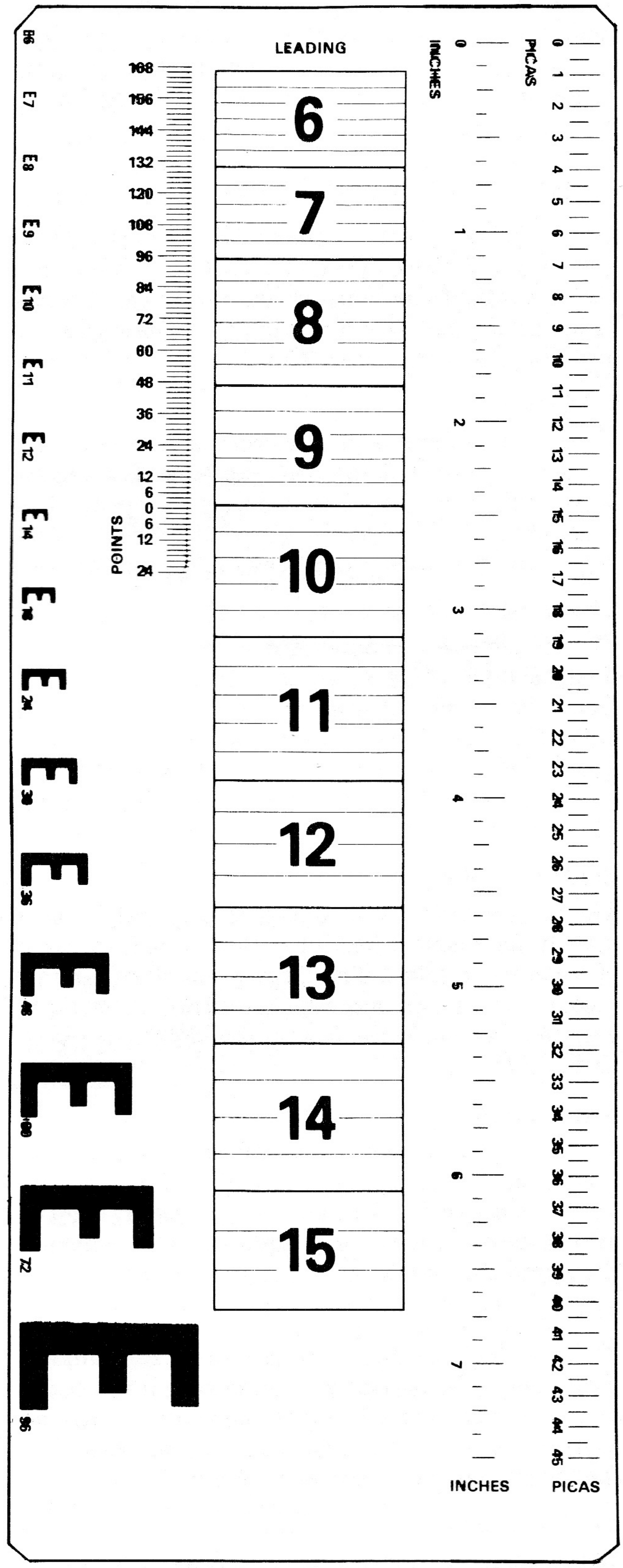


Figure 3–15 Compugraphic ruler indicates picas, points, and leading.

Line length for typeset copy is specified in picas, as is the *depth* (the vertical measurement) of typeset material. For example, a block of typeset material 3 inches wide by 5 inches deep would be designated as 18 picas wide and 30 picas deep.

Line Space (Leading)

Line space, commonly called *leading,* is the vertical white space between the lines of a typeset page. The line space is measured from one base line to the next (Figure 3-16). The main purpose of leading is to make the page easier to read.

When the line space equals the point size, the type is said to be *set solid.* Most type, however, is set with one or two extra points of leading, to make it easier to read. When marking type sizes on a manuscript, the point size is usually followed by the amount of leading required. For example, 10-point type without extra leading would be designated "10/10" (pronounced "ten on ten"). If the 10-point type was to be set with two extra points of space between lines, the type would be specified as "10/12" ("ten on twelve").

This is an example of a 7-point typeface
typeset with the leading switches set at seven — 7/7
points.

This is an example of a 7-point typeface
typeset with the leading switches set at nine — 7/9
points.

This is an example of a 7-point typeface
typeset with the leading switches set at — 7/12
twelve points.

This is an example of a 7-point typeface
typeset with the leading switches set at four- — 7/14
teen points.

Figure 3–16 Examples of leading with 7-point type.

Fixed Spaces

In specifying type, designers often refer to *em spaces* and *en spaces.* An *em space* is a blank square as wide as the letter *m* in a particular typeface. In 10-point type, the em space is 10 points wide and 10 points high. In 12-point type, it is 12 points wide and 12 points high. The en space is half as wide as the em space. The em space and the en space are commonly used to indicate how far a paragraph or a list should be indented (Figure 3-17).

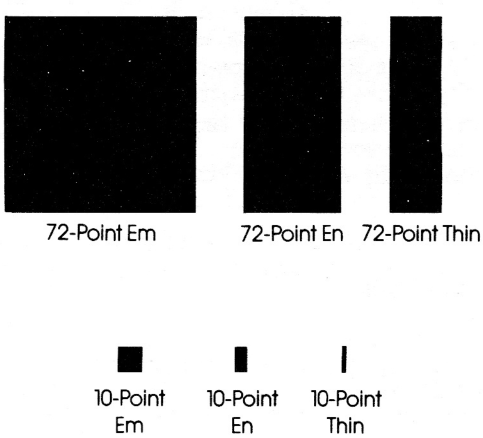


Figure 3–17

Other Terminology

The following basic terms are also important for understanding typesetting.

Text and Display

Text type, or *body type,* ranges from 6 to 12 points in size. It is used for setting most books, magazines, and reports. *Display* type ranges from 14 to 72 points in size. It is generally used for headlines, advertisements, title pages, and chapter headings.

Over 95 percent of all type is lowercase composition. Words comprised of lowercase characters can be read much faster than words set in all capitals. Lowercase headlines also save space over headlines set in all capitals—up to 30 percent more space.

Kerning

Kerning means adjusting the white space between certain letters in order to achieve a more attractive fit (Figure 3-18). Some phototypesetting systems offer the option of preprogrammed kerning. The operator simply types the copy, and the phototypesetting machine knows which characters are to be kerned, and by how much. On equipment without the kerning option, the operator has to be aware of which letter combinations need to be kerned.

Letterspacing

Letterspacing is the insertion of very small amounts of white space between the characters in a word (Figure 3-19). *Negative letterspacing* is the

V A W A
VA WA

The removal of white space on some capital letter combinations make the copy more readable and attractive.

Figure 3–18

Letterspacing

no letterspacing	letterspacing
2 pt. letterspacing	l e t t e r s p a c i n g
4 pt. letterspacing	l e t t e r s p a c i n g

Letterspacing is the amount of space between letters, negative or positive, either for line setting, readability, economics, or aesthetics.

Figure 3–19

removal of small bits of space between words. Letterspacing and negative letterspacing are necessary for justifying short lines. *Word spacing* is another possible technique for justifying a line; however, word spacing tends to leave bigger holes and is not nearly as pleasing to the eye.

Arrangement

Type can be arranged in five different ways (Figure 3-20).

Justified (Flush Left, Flush Right). When all lines are the same length *(flush left and right),* a page is said to be *justified.* Most reading matter is set justified, because this arrangement is best for sustained reading comfort. The page has a symmetrical, quiet look and does not distract the reader.

Unjustified (Flush Left, Ragged Right). Most poetry and typewritten copy appears unjustified, with an uneven *(ragged)* right margin. Because of the equal word spacing, the type has an even texture and is easy to read. The risk of white rivers flowing down the page is eliminated. This is especially appealing when the type is to be set in narrow columns. Hyphenating words is virtually unnecessary. Some people feel the ragged edge on the right adds visual interest to the page.

Unjustified (Flush Right, Ragged Left). Because unjustified, ragged-left setting is not used frequently, this arrangement may create an interesting layout for very short copy. However, since readers are accustomed to reading from left to right, a ragged left edge increases reading difficulty.

Centered. Another way of arranging type is centering the lines one over the other so that both left and right sides are ragged. *Centered* lines give the page a look of dignity; however, reading centered lines demands more of the reader because of the difficulty of finding the beginning of each new line. Centered type is better suited to small amounts of copy.

Asymmetrical. In an *asymmetrical* arrangement, no predictable pattern in length or placement of lines exists; the lines are placed so that they look right. Naturally, this method is not recommended for textbooks or for any lengthy reading matter. It does provide a dramatic device suitable for posters, book jackets, advertisements, and other display type that is used to attract attention.

Justified

This text is set justified. Notice that each line has been set to the full width, that the typesetter hyphenates where necessary, and that the space between words varies. Justified copy is used for many typesetting applications.

Ragged Right

This demonstrates ragged right text. Notice that
hyphenation is rarely used in ragged right copy
and that all interword spaces are the same
width. Ragged right is a very popular style of
typesetting.

Ragged Left

This copy is set ragged left, the opposite of the
ragged right copy above. Notice that the left
margin is ragged, and that the right margin
is flush.

Ragged Center

This copy is set ragged center. Each line is
automatically centered, and all interword
spaces are the same width.

Asymmetrical

This copy is asymmetrical.
Notice that there is no predictable
pattern in length or placement
of the lines. It provides a
dramatic device suitable
for display work to attract attention.

Figure 3–20

REVIEW QUESTIONS

Multiple Choice

Directions: In the blanks, write the letter of the choice that best completes each statement.

_______ 1. Type that is not uniformly spaced but is calculated on the basis of units for letters, numbers, and symbols is known as
a. elite type
b. primary type
c. proportional type
d. pica type

_______ 2. The standard unit of measurement in typesetting, equal to 1/72 of an inch, is the
a. point
b. pica
c. line space
d. leading

_______ 3. The vertical white space between the lines of a typeset page is the
a. pica
b. fixed space
c. thin space
d. line space or leading

_______ 4. Removing white space between certain combinations of characters to achieve a more pleasing fit is
a. kerning
b. justification
c. letterspacing
d. leading

_______ 5. A justified page of type is set
a. flush left, ragged right
b. flush left, flush right
c. centered
d. ragged left, flush right

Matching

Directions: In each blank, write the letter of the term that best matches the description.

_______	1. 10 units per inch	a.	ascender
_______	2. 12 units per inch	b.	decorative types
_______	3. the upper stroke in type	c.	descender
_______	4. the downward stroke in type	d.	elite
_______	5. the short crossline at the end of a main stroke	e.	Oldstyle
_______	6. a machine with a vertically rotating type element	f.	pica
_______	7. the body of a lowercase letter	g.	script
_______	8. type that resembles handwriting	h.	serif
_______	9. novelty styles or faces used primarily to command attention	i.	daisy wheel printer
		j.	x-height
_______	10. a type style patterned after letter forms used on classical Roman inscriptions		

SUGGESTED ACTIVITIES

a. Investigate the art of typography in your library, and prepare an oral or written report on the subject.
b. Obtain a type specification sheet from a typesetting vendor or a typesetting shop.
c. Visit a typesetting shop and observe the operator of a phototypesetting machine at work.

4

TYPESETTING

Objectives

After completing this chapter, you will be able to:

1. List and discuss four reasons for typesetting copy.
2. Trace the four stages in the history of typesetting.
3. Briefly explain the four generations of phototypesetting equipment.
4. Describe five advantages of phototypesetting equipment over the other three methods of setting type.

First developed in the fifteenth century, type has had a great impact on human history. The methods of setting type, however, changed very little until the invention of the linotype in the nineteenth century. The next major development occurred after World War II, when photography made a giant contribution to the typesetting process. More recently, computers have been introduced into the typesetting. An entire newspaper page can be set in type in a few minutes, compared with the hours required by older methods. Typesetting speed today is measured in microseconds (millionths of a second) per line of type.

Because of photography and computers, the cost of typography and typesetting equipment has dropped to a fraction of what it was twenty years ago. The equipment of twenty years ago would make a typeset page about 240 times more expensive than would today's processes. Type has become one of the most important and widespread communication media, and has realized more growth in recent years than any other communications process.

ADVANTAGES OF TYPESETTING

There are four major reasons for using typeset copy rather than typewritten copy. Typeset copy

- ☐ looks better
- ☐ is easier to read
- ☐ has a higher comprehension rate
- ☐ costs less.

Appearance

Copy that is typeset looks better for a variety of reasons. Sizes of type ranging from 6 to 72 points can be used, along with hundreds of different typefaces. Emphasis can be made by using bold, italic, or reverse printing. In typewritten copy, the faces are limited basically to elite or pica type. The typewriter typeface can be changed to a few different styles, but the process of changing the element or print wheel is quite time-consuming. Each typeset character is assigned its own designated amount of horizontal spacing, making the characters fit snugly together for proportionally spaced type. Although proportionally spaced typewriters are available, features such as *kerning* and *letterspacing* (explained in Chapter 3) are not. Typesetting allows special symbols and characters (known as pi characters), foreign languages, and rules and borders that are not possible on the typewriter. *Justification* also makes typeset copy look better, although this feature is now available on many text editors.

Greater Readability

Material that is typeset is easier to read, not only because it looks better but because individual letterspace is sharper. Typeset copy reproduces better than ordinary typing.

Higher Comprehension Rate

Typeset text is not only more readable but also more *legible*. For example, compare the two versions of this sentence. The typeset version takes up

```
St. Louis, gateway to the West,
is on the Mississippi River.
```

St. Louis, gateway to the West, is on the Mississippi River.

38 percent less space than the typewritten version. Reducing the length of the line increases reading comprehension. Multiple columns of typeset copy can also increase reading comprehension, because the eye does not have to spend as much time traveling back from the right edge to the left edge of the copy (see Figures 4-1a and 4-1b).

Lower Costs

The compactness of typeset copy can also reduce costs. A 100-page typewritten manual can easily become a 60-page typeset manual. Such compaction results in a dramatic savings in reproduction and distribution expenses. This means less paper, fewer printing plates, less ink, less collating, less binding, and less stitching.

The smaller manual also occupies less storage space—a considerable difference in a stack of 1,000 manuals, each containing 60 pages rather than 100. If 100,000 copies of such a manual were needed, the typewritten manual would require a storage space 33-1/3 feet high, whereas the typeset manual would take 20 feet. With the high cost of office space, storage is an important factor to consider. If the manuals are needed at another location, typesetting would save the difference in postage or shipping costs between 1,000 pounds and 600 pounds (almost a quarter of a ton) for the 100,000 copies.

HISTORY OF TYPESETTING

Historically, four methods of typesetting have evolved over the years: handset, casting, typewriter composition, and photocomposition. Although all four methods can be found in print shops today, most composition is done with the last two methods. In the future, photocomposition will be virtually the only method. The typewriter will be an input device and communication or conversion techniques will be used to prepare the material for phototypesetting.

Handset Type

Handset composition is produced with individual metal characters assembled into lines, much as Gutenberg did in 1450. A composing stick is held in one hand while the letters are selected from a type case with the other hand and placed in the stick until a full line is set (Figures 4-2 and 4-3). Different spaces are inserted between words in order to justify the line. For line spacing, metal strips or slugs (called *leads*) are inserted between the lines. Although the compositor (typesetter) selects the letters quickly and instinctively, the task is a relatively slow, time-consuming process. Handset type is not commonly used for direct reproduction. Either a duplicate plate is made for letterpress printing, or inked proofs are made which are later photographed for offset printing. The type is set in reverse, so that it reads correctly when printed. After printing, the individual letters must be cleaned and redistributed into their proper compartments for future use.

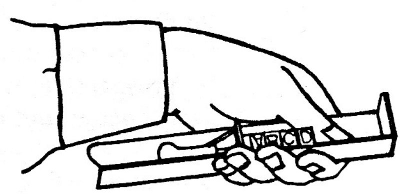


Figure 4–2

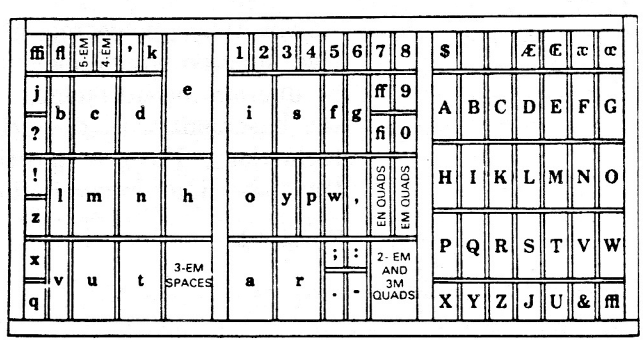


Figure 4–3 A type case.

THE "OFFICE OF THE FUTURE" CONCEPT

The "Office of the Future" concept is awakening computer manufacturers to the fact that their products that support the office environment will now be more carefully assessed by prospective buyers as to how these products contribute to this concept and profits.

One area being affected by office automation is photocomposition. To help clarify this issue, Compugraphic Corporation, the leader in the photocomposition industry has accepted the challenge of defining where and how phototypesetting fits into the profit picture.

At one time photocomposition was viewed as an art or creative function which does not lend itself to standardization or production measurements, or as a function that should be in the basement with the printing press. But not with today's technology. Photocomposition is now viewed as a part of the modern, automated office environment.

Figure 4–1a

THE "OFFICE OF THE FUTURE" CONCEPT

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Figure 4–1b

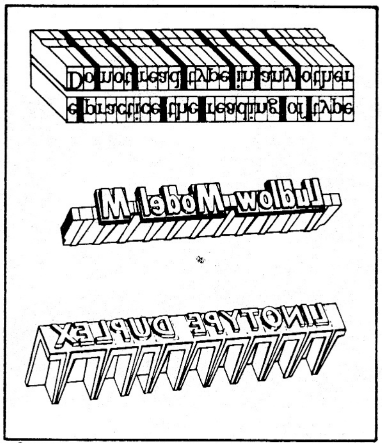


Figure 4–4 Linecasting in molten metal.

Casting

Casting is done on a machine called a *linecaster* or *linotype* by an operator sitting at a keyboard very much like a typewriter. When a key is struck, a mold (or *matrix*) of the required letter is brought into contact with molten metal (Figure 4-4). The metal solidifies and the letter is produced—hence the term *hot type*. The operator can strike out a whole line on the keyboard before casting it. After plates have been made, the metal is remelted and reused. Casting is much faster than handset composition, but it is limited by the speed of the operator.

In metal composition—both handset and casting—a block of type called a *form* is locked up in a *chase*—a heavy rectangular steel frame. The empty spaces are filled up with *furniture* (wood or metal blocks), and *quoins* (steel wedge-shaped devices) are placed on two adjacent sides. The quoins are tightened slightly, and the form is checked for levelness. Once the type is level, the quoins are tightened to hold the form securely in place.

Typewriter Composition

Typewriter, or *strike-on,* composition is one variety of *cold type*. Ordinary typewriters can be used for composition. Machines used especially for strike-on composition are the VariTyper, Justowriter, or IBM's Electronic Composer (Figure 4-5). The disadvantage of these machines is that each line must be typed twice in order to justify it, and a great variety of typefaces and sizes is impossible. Typewriters or text editors using carbon ribbons can also provide good strike-on composition; however, these are also limited in type sizes and typefaces. An electronic text editor, however, can automatically justify the right margin.

Photocomposition

Photocomposition, or *phototypesetting,* has virtually eliminated hot-metal typesetting. Thus, photocomposition is the most widespread method of *cold type* composition.

Phototypesetting began in the 1940s and has undergone a four-generation development. The *first generation* used mechanical principles to adapt photography to existing linotype machines. In these machines, the master character image was carried on each matrix. The matrix contained a film negative of the character and was photographed instead of being cast. The *second generation,* which began in 1956, used a spinning master negative of each font, and a strobe lamp flashed characters onto photographic paper. The *third generation* of phototypesetters uses cathode ray tubes (CRTs) and is totally electronic. Characters are formed on the screen of a CRT (like a small television screen) by a series of minute dots or lines. Keystrokes are captured, or recorded, on a magnetic disk, which then drives the photo unit. This third generation development is also referred to as a photowordprocessor. The *fourth generation* of phototypesetters is emerging with new developments in laser imaging.

Phototypesetting equipment today varies from machines that set individual letters manually to those that are entirely computer operated (see Figures 4-6, 4-7, and 4-8). The advantages of phototypesetting equipment are many:

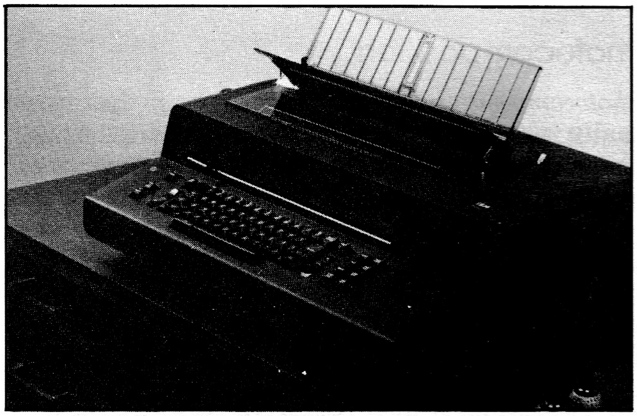
Speed. Machines can print out at rapid rates. Input is limited in speed, because copy must be keyboarded at some stage.

Quality. The letters are always sharp, regardless of size. With metal type, the pressure of the metal against the paper causes ink-squeeze, which tends to make the edges of the letters rough.

Flexibility. Letters can be set touching or overlapping. The use of prisms in the phototypesetter allows letters to be slanted, extended, or condensed. With metal, there is a limit to just how close together the letters can be set.

Ease. Individual letters are printed directly onto photosensitive paper, thus eliminating the need of ink, cleanup, and remelting.

Integration with Other Systems. Phototypesetting allows the integration of typesetting with a variety of input processes (these are discussed in more detail in Part IV).

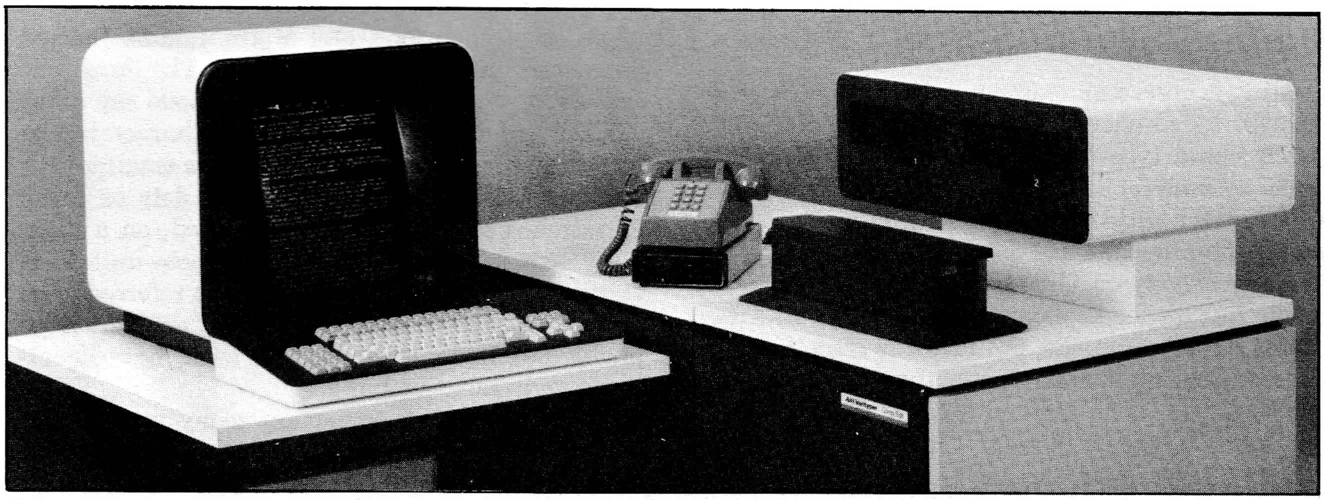


IBM.

Figure 4–5 IBM Electronic "Selectric" Composer.

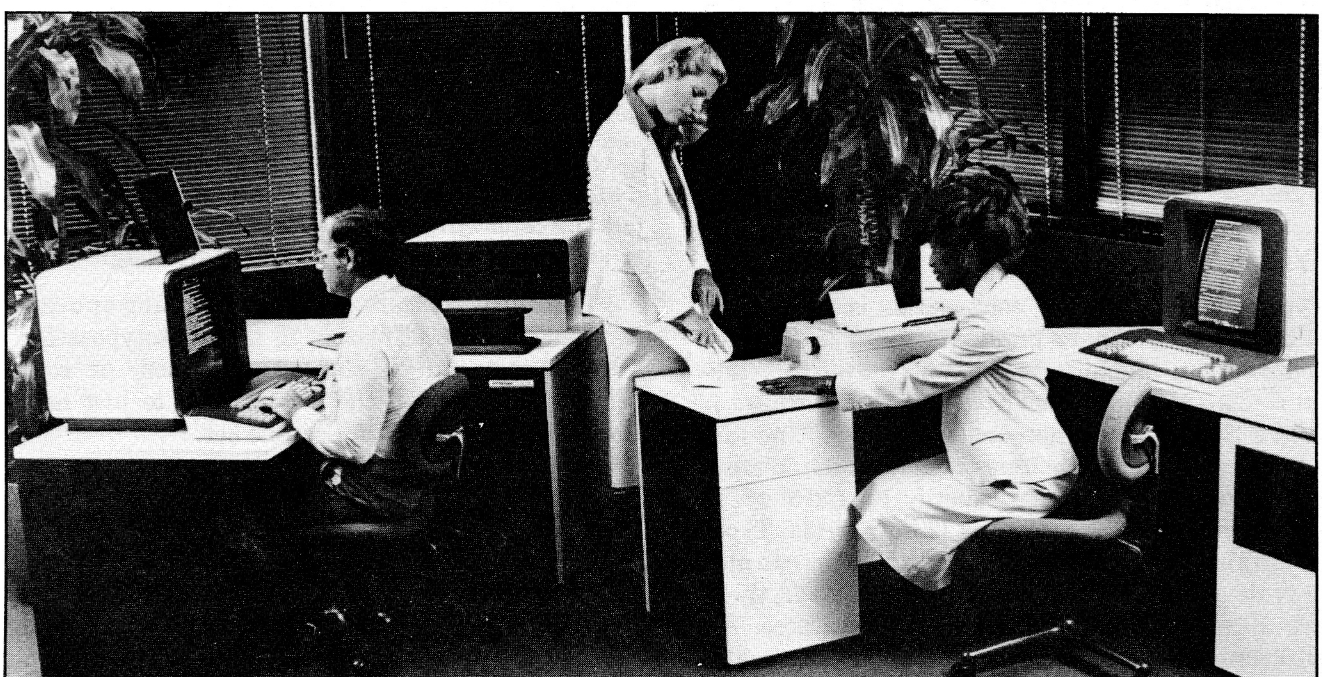
Compugraphic.

Figure 4–7 Compugraphic EditWriter 7500.



Addressograph/Multigraph.

Figure 4–6 AM Varityper Comp/Edit.



AM Jacquard.

Figure 4–8 AM Jacquard Systems.

REVIEW QUESTIONS

True / False

Directions: Write a "T" in each blank if the statement is true, and an "F" if the statement is false.

_______ 1. Typesetting uses elite or pica type.

_______ 2. Kerning is a function found on most electric typewriters.

_______ 3. The compactness of typeset copy can reduce costs.

_______ 4. Photocomposition is also known as "cold type."

_______ 5. The third generation of phototypesetters is characterized by cathode ray tubes and electronics.

_______ 6. The linotype casts lines of type in molten metal.

_______ 7. Letters created from phototypesetting are somewhat dull and fuzzy.

_______ 8. In phototypesetting, keystrokes may be captured on a magnetic disk.

_______ 9. Most standard typewriters can automatically justify the right margin.

_______ 10. Because of photography and computers, the cost of typography and typesetting has more than tripled in the past twenty years.

Multiple Choice

Directions: In the blanks, write the letter of the choice that best completes each statement.

_______ 1. The reason(s) for using typeset copy rather than typewritten copy is (are):
a. it looks better
b. it is easier to read
c. it has a higher comprehension rate
d. all of the above

_______ 2. Most composition today is done by
a. casting
b. typewritten composition
c. photocomposition
d. b and c

_______ 3. As a rule of thumb, typesetting can compact typewritten material by approximately
a. 10%
b. 40%
c. 50%
d. 80%

_______ 4. Handset composition began in the
a. 1400s
b. 1500s
c. 1600s
d. 1900s

_______ 5. Photocomposition began in the
a. 1750s
b. 1860s
c. 1940s
d. 1970s

SUGGESTED ACTIVITIES

a. Contact a photocomposition vendor to speak to the class on phototypesetting equipment. Find and distribute brochures and catalogs.
b. Invite a speaker from a typesetting or print shop to discuss one or both of these topics:
   1. The impact of phototypesetting on the world of business
   2. Career changes in the typesetting field
c. Visit a typesetting or print shop and identify the type of typesetting equipment used (handset, casting, typewriter composition, or photocomposition of the first, second, or third generation).

5

MARKUP AND PROOFREADING

Objectives

After completing this chapter, you will be able to:

1. Name and explain the four parameters used to mark up copy for typesetting.
2. Mark and read copy using proofreader's marks.
3. Describe the three stages of proofing typewritten copy.
4. Describe the three stages of proofreading typeset copy.
5. Practice the ten proofreading guidelines while proofing copy.

Accuracy is extremely important in copy processing and reprographics work. An unnoticed and uncorrected error is multiplied by the number of copies being produced. Checking for accuracy begins long before the copy is ready to be printed. The author or originator and several skilled readers should examine the copy meticulously to correct or query errors of fact, grammar and usage, and keyboarding. At this stage, the activity includes editing as well as proofreading.

The next stage involves careful markup of the copy, giving instruction on how the copy is to be typeset. This step should also be checked carefully to determine that the output is going to look like what you want. A knowledge of proofreader's marks is needed, in addition to other knowledge concerning the typesetting *specifications,* or *specs.*

The final stage involves proofreading the copy after it has been typeset and using the proofreader's marks to give instructions for corrections, changes, additions, or deletions.

MARKUP

Accurate copy markup eliminates guessing, speeds completion, and keeps costs down. After deciding upon the specifications, proper directions must be given to the typesetter. This information should be written on the manuscript with a ballpoint pen, colored pencil, or felt-tip markers to separate the specs clearly from the copy to be typeset. Instructions should be legible and precise, and should allow no chance of misinterpretation.

The four main specifications to include in the markup are *typeface, point size, line spacing* (or *leading*), and *line length.* The typeface is chosen from a sample sheet provided by the typesetter (Figure 5-1). Since thousands of styles are available, each typesetter makes a limited selection of faces suitable for most work. Next the type size and leading are specified in the form of a fraction, in which the upper number represents the point size of the type and the lower number the line spacing or leading. For example, 10/12 means that the type is to be 10 points, with two extra points of leading, for a total of 12 points, inserted between lines. The line length should be specified in picas (see Chapter 3 for an explanation of points and picas).

If the specs for typeface, point size, leading, or line length change, the new specs should be marked in the copy at the point of the change. Other instructions should be made according to the proofreader's marks given in the next section.

American Classic	Avant Garde Medium Condensed	***Benguiat Bold Italic***
American Classic Italic	**Avant Garde Demi Condensed**	Benguiat Book Condensed
American Classic Bold	**Avant Garde Bold Condensed**	**Benguiat Bold Condensed**
American Classic Extrabold	Basque	Bookman
Antique Olive	Bauhaus Light	*Bookman Italic*
Antique Olive Medium	Bauhaus Medium	*Brush*
Antique Olive Bold	**Bauhaus Demi**	BUSORAMA LIGHT
Antique Olive Compact	**Bauhaus Bold**	BUSORAMA BOLD
Avant Garde Extralight	Benguiat Book	Century Oldstyle
Avant Garde Book	*Benguiat Book Italic*	*Century Oldstyle Italic*
Avant Garde Medium	Benguiat Medium	**Century Oldstyle Bold**
Avant Garde Bold	*Benguiat Medium Italic*	CENTURY OLDSTYLE SMALL CAPS
Avant Garde Book Condensed	**Benguiat Bold**	Cheltenham Oldstyle

Figure 5-1

PROOFREADER'S MARKS

Proofreader's marks are the symbols used to indicate changes, additions to, and deletions from copy. They are really a shorthand that should be learned and used by everyone who contributes to the production cycle, including the author (or originator), the typist, the secretary, the typesetter, and the proofreader. Making such corrections in colored pen or pencil enables them to be seen more easily. These are the basic proofreader's marks.

Although the proofreader's marks are similar for typewritten and typeset copy, the proofreading steps will be considered in different sections because there are some differences in procedure.

PROOFREADING TYPEWRITTEN COPY

Triple care should be exercised in the proofreading and first-copy check of material being duplicated. The services of another person are extremely helpful during all of the three steps of proofing and the first-copy check. One's own errors are hard to see; yet, most people enjoy finding errors made by others.

First Proofing

A complete page should be proofed before it is removed from the typewriter. It is much easier to make a correction while the page is still in the typewriter than to reinsert the page and align the type.

Second Proofing

After the page has been removed from the typewriter, it should be proofed again. Except in rush cases, it is better to lay the page aside and come back for this proofing at another time. The safest (and slowest) method is to have one person read aloud from the original copy while another person checks the newly prepared copy. If the proofing must be done by one person, the new copy should be checked phrase by phrase against the original copy. Errors should be marked conspicuously (but not permanently), so that they can be located easily when making the corrections. Paper clips or lightly penciled and easily erasable notations in the margins are good error markers.

Third Proofing

The third proofing should come after duplication of the first few copies (except in the case of carbon copies). In addition to examining the material for incompleteness and typographical errors, the proofreader should check the copy for *alignment*. It may be too high or too low (vertical error), or it may be too far to one side (horizontal error). If the material is to be bound, it should run so that the copy will be centered *after* the binding has been done, not before.

Various kinds of binding require different amounts of space. If the material is to be punched or folded, adjustments should be made accordingly. If the copy is crooked or has smudges on either the front or back of the copies, these errors can be corrected on the duplicating machine.

A registration check can save paper as well as save time. Often an inexperienced operator will run several hundred copies and then discover that the material is not centered properly. The operator is then faced with wasting several hundred sheets of paper or having to use the poor copies. A simple machine adjustment can often prevent several hundred or several thousand errors.

SYMBOL	MEANING	EXAMPLE	CORRECTED VERSION
Delete and Insert			
	delete, take out	Proofreader's~~s~~ marks	Proofreader's marks
	close up	type writer	typewriter
and	delete and close up	Phototttypesetting	Phototypesetting
∧	insert a word or letter	Markup∧Proofreadi∧g (and, n)	Markup and Proofreading
#	add space	points and∧picas	points and picas
○ and sp	spell out numbers or abbreviations	This typewriter is 10 yrs old. sp //	This typewriter is ten years old.
..... and stet	let the copy stand, ignore the correction	Make all ~~the~~ corrections stet	Make all the corrections.
	close up	copy mark up	copy markup
Punctuation Marks			
⊙	period	The work is difficult⊙	The work is difficult.
	comma	authors secretaries and typesetters	authors, secretaries, and typesetters
:/ ;/	colon, semicolon	the first reason lower costs :/;/	the first reason: lower costs;
	apostrophe, single quotes	the typesetter s specs	the typesetter's 'specs'
	quotation marks	"hot type" versus "cold type"	"hot type" versus "cold type"
=	hyphen	computer aided composition	computer-aided composition
1/m	dash	a real advantage lowered costs	a real advantage—lowered costs
( )	parentheses	line space or leading	line space (or leading)
Paragraphing and Position			
and tr	transpose letters or words	reprograhpics or processing copy tr //	reprographics or copy processing
	move right	6 / 3 / 9	6 / 3 / 9
	move left	1.17 / 2.29	1.17 / 2.29
	move up	Add these figures	Add these figures
	move down	Record the results.	Record the results.
□ or m	1 em indentation	This is the formula: E=mc²	This is the formula: E=mc²
¶	new paragraph	Typesetting is completed. ¶ The next stage is proofreading.	Typesetting is completed. The next stage is proofreading.
no ¶	no new paragraph	You should read the copy for obvious errors. no ¶ You should also read for sense.	You should read the copy for obvious errors. You should also read for sense.
Style of Type			
wf	wrong font (style)	Proofreading **typewritten** Copy wf	Proofreading typewritten Copy
/ and lc	set lowercase	Careers In The Repro-graphics Field lc //	Careers in the Repro-graphics Field
≡ and cap	set uppercase	The ibm executive caps ///	the IBM Executive
/ or ⌐ and u/lc	set uppercase and lowercase	FIRST PROOFING u/lc	First Proofing
____ and ital	set in italics	Have you read Copy Processing? ital	Have you read *Copy Processing?*
and bf	set in boldface	Speed. Photocomposition is much faster than typing bf	**Speed.** Photocomposition is much faster than typing

PROOFREADING TYPESET COPY

The first and second steps in proofreading typeset copy are the same as for typewritten copy. However, additional steps are needed when working with the typeset proofs. The print shop has some responsibility in proofing, but the final burden is shared with the originator. Most shops (whether in-plant or outside) request a signature to indicate that the final proof has been approved. This signature shifts responsibility to the originator. Errors made by the typesetter are corrected without charge, but a charge may be added if changes other than typographical ones are made to the copy. The proofing can be broken down into three stages.

RIBBON TESTING

as criteria

sp The U.S. Govt specified the following test for acceptance of a good

3 ribbon. A pre determined area of the ribbon for instance 10 inches is

3

used to write about 30 to 45 lines across an 11 x 8½ inch sheet. It is tr

e

e apparant that the last lines, perhaps from 25 to 30, will appear much

tr lihgter than the initial lines The ribbon is then allowed to rest for

about 30 to 35 minutes, and the same area of the ribbon which has

to type It is now required that

been used before is used again an additional 10 to 15 lines. The first lc

be

lines of the second typing ~~are~~ equivalent in strength to about line

number 10 or 12 of the first typing, Some of the ink has flowed from

surrounding

the parts of the ribbon to the depleted band. The more fluid the ink

ability

the greater the recovery and the greater the prob. that the ink is too

oily and will smear.

e

no ¶ Drying may be caused by evaporation and/or oxidation of the

if possible

oil. Remember to rotate ribbons to make use of the recovery power.

RIBBON TESTING

The U.S. Government specified the following test as criteria for acceptance of a good ribbon. A predetermined area of the ribbon, for instance 10 inches, is used to write about 30 to 35 lines across an 8½ x 11 inch sheet. It is apparent that the last lines, perhaps from 25 to 30, will appear much lighter than the initial lines. The ribbon is then allowed to rest for about 30 to 35 minutes, and the same area of the ribbon which has been used before is used again to type an additional 10 to 15 lines. It is now required that the first lines of the second typing be equivalent in strength to about line number 10 or 12 of the first typing. Some of the ink has flowed from the surrounding parts of the ribbon to the depleted band. The more fluid the ink, the greater the recovery, and the greater the probability that the ink is too oily and will smear. Drying may be caused by evaporation and or oxidation of the oil. Remember to rotate ribbons if possible to make use of the recovery power.

Figure 5–2

First Stage

The first proofing of the copy should be done on the typewritten copy to be sent to the typesetter. The copy should be clean and readable but can contain corrections made with proofreader's marks. Typesetting markup instructions should also be checked carefully before the copy is submitted.

Second Stage

The next phase of proofing is actually done by the typesetter or proofreader before the proofs are sent to the originator. At this stage, the task is mainly checking to see that the copy is complete and correct, and that markup instructions were followed. If an obvious error exists in the original copy, the typesetter may make the correction. Many typesetters, however, will simply note an error in the copy and leave correction up to the originator.

Third Stage

The final proofing chore rests with the originator. This proofing is a last look and should be done with care, using the Proofreading Guidelines given in the next section. It is best to take the copy and the proofs to a desk and read them carefully, rather than glancing over them while standing at a counter. When possible, the proofs should be checked by two proofreaders. If there are major revisions to the typeset copy, the second and third proofing steps should be repeated to be sure that all corrections were made properly. Figure 5-2 shows a piece of typeset copy that has been proofread.

PROOFREADING GUIDELINES

The following Proofreading Guidelines apply to either typewritten or typeset copy:

1. Read the copy with the aid of a ruler or a copyholding stand with a line indicator.
2. If you find an error in a line, be sure to check the balance of that line carefully. Often, a proofreader will become careless after making an initial correction, and skim over the second and third errors in a line.
3. If the copy indicates a list or series, such as "The first five presidents are," etc., make sure that there really *are* five presidents in the copy, and not four or six.
4. Check dates carefully. For example, if the copy says Wednesday, July 8, check that July 8 *is* a Wednesday.
5. Symbols such as quotes, parentheses, braces, ellipses, and dashes act as a pair of hands holding phrases; always look for the second symbol.
6. Hyphenated words require extra care. Use a dictionary to be sure they have been broken at the proper syllables.
7. Check combinations of "l" with "t" or "f" carefully; "tl" can easily be confused with "tt" at a casual glance.
8. Check grammar carefully. Be sure that subjects and verbs always agree; that is, that both are singular or both are plural.
9. Typographic errors that make a new word (such as "part" for "port," or "real" for "reel") are exceptionally hard to find. Read for *sense* (meaning) as well as for accuracy.

REVIEW QUESTIONS

Multiple Choice

Directions: In the blanks, write the letter of the choice that best completes each statement.

______ 1. Generally, the typewritten copy should be proofed
- a. once
- b. twice
- c. three times
- d. four times

______ 2. The proofreaders should
- a. check grammar carefully
- b. pay special attention to series and lists
- c. check hyphenated words in the dictionary
- d. all of the above

_______ 3. The final proofing responsibility rests with the
- a. proofreader
- b. typesetter
- c. originator
- d. typist

_______ 4. In typesetting, the proofing that is done by the typesetter or proofreader is the
- a. first stage
- b. second stage
- c. third stage
- d. fourth stage

_______ 5. The person marking up copy for typesetting should specify
- a. typeface and point size
- b. typeface and line length
- c. point size and leading
- d. typeface, point size, line length, and leading

Matching

Directions: In each blank, write the letter of the term that best matches the description.

_______ 1. $\boxed{M}$

_______ 2. bf

_______ 3.

_______ 4.

_______ 5. tr

_______ 6. lc

_______ 7. ¶

_______ 8. #

_______ 9. stet

_______ 10.]

- a. insert space
- b. let it stand as was
- c. close up or take out space
- d. one em space or indentation
- e. begin a paragraph
- f. set in lowercase
- g. set in boldface
- h. move right
- i. delete
- j. transposition

SUGGESTED ACTIVITIES

a. Practice proofreading and marking typewritten copy, using the proofreader's marks learned in this chapter.

b. Type a paragraph with errors and exchange it with a classmate. Mark any errors using proofreader's marks. Exchange your paragraphs again, and correct your errors.

c. Obtain and examine some marked proofs from a typesetting or printing plant.

6
COPYFITTING, LAYOUT, AND PASTEUP

Objectives

After completing this chapter, you will be able to:

1. Define copyfitting.
2. Use the typefitting chart to solve a copyfitting problem.
3. Explain the percentage method of reduction or enlargement on a piece of artwork or a photograph.
4. Discuss five principles to consider in designing a layout.
5. List and explain five typographic principles to remember when designing a layout.
6. Describe five steps in the pasteup process.
7. List the various categories of tools used in pasteup.

COPYFITTING

Copyfitting means determining the amount of manuscript copy that can fit into a given area for a specified size and style of type. There are many different approaches to copyfitting. The easiest and most logical approach was designed by Leslie Rasberry in his book *Computer Age Copyfitting.*[1] This system has been endorsed by the National Composition Association. This chapter will look at the types of problems involved in copyfitting, the factors affecting typewritten and typeset copy and the typefitting chart itself.

Types of Problems

The problems involved in copyfitting fall into six categories:

1. How much typewritten copy is needed to fit a layout in specified type?
2. How much leading should be added to make the type fill a given depth?
3. What size type should be used to fit the typewritten copy to a given layout?
4. What line length should be used when the depth is inflexible?
5. How many picas deep will a body of type set in a specified type?
6. How many pages will a book contain when the manuscript is set to given specifications?

Factors

There are eight factors involved in copyfitting. Three factors have to do with the typewriter, and

1. This section was adopted from *Computer Age Copyfitting* (New York: Art Direction Book Co., 1977). For a copy of this book, write to Art Direction Book Co., 10 East 39th Street, New York, NY 10016.

five with type. One, and sometimes two, of these factors will be unknown, and the problem is to determine the value of the unknown factor or factors.

Typewriter

1. Pitch. Pitch is the number of letters or characters a typewriter types in a line one inch long. For pica type the pitch is 10; for elite type it is 12. If a typewriter fits neither of these categories, one inch of a line of copy should be measured and the characters in it counted.

2. Line Length. Line length is the length, in inches, of a line of typewritten copy. The line length will seldom come out in an even number of inches. In measuring line length, estimate what portion of an inch the left-over letters occupy and state the amount as a fraction of an inch. Convert all fractions to decimals if a calculator is used for figuring totals. Where there is a large body of copy with fairly consistent line lengths, estimate the length of an average line. For example, if several lines vary between 5 and 6 inches in length, an average line length of 5½ (5.5) inches would be appropriate.

3. Number of Lines. To calculate the total number of typewritten lines in a piece of copy, first count the lines on a single page. Partial lines at the end of paragraphs are usually treated as full lines, but they may be stated as decimal fractions. With lengthy manuscripts, estimate the total number of lines by multiplying the number of pages by the average number of lines per page.

Type

4. Type Size Plus Leading. Type size is the nominal size of the typeface in points. Leading is the extra spacing between lines of type, also expressed in points. The body size of type is obtained by adding the face size and leading together, and it is the body size that you will use in copyfitting calculations.

5. Characters per Pica. This measurement is the number of lowercase letters of a specific type that will fit into a space one pica wide. This information should be obtainable from a type specimen catalog. If the typesetter cannot supply such a catalog, then measure a sample of the type 10 picas wide, count the characters in the line, and divide by 10. The space between words counts as one character. For example, if a 10-pica sample contains 23 characters, it will contain 2.3 characters per pica. If all-capital letters are specified, a sample measure of all capitals must be taken, or an approximate figure may be obtained by multiplying .7 by the lowercase count. The all-capitals count for the above example would be $.7 \times 2.3 = 1.6$ characters per pica.

6. Measure. The measure is the length of a line of type, expressed in picas. To obtain this value, measure the width of the type area in the layout. If the type area has an irregular shape in which line measures vary, determine an average line measure as you did with typewritten copy.

7. Depth. The depth of a piece of copy is the distance, measured in picas, from the top to the bottom of the type area. This too is obtained by measuring the layout. In certain cases, depth may be expressed as the number of lines of type rather than in picas.

8. Points per Pica. Since there are 12 points in a pica, the number of picas can be multiplied by 12 to obtain this figure.

Typefitting Chart Rules

These four simple rules are the basis for solving all typefitting problems:

1. Fill in all the known factors.
2. Determine which factor is unknown. A question mark may be lightly penciled into this segment.
3. Fill in the mathematical signs. Place a division sign in the horizontal row of the chart that contains the unknown factor; all factors in this row become divisors. Place a multiplication sign in the other row; factors in this row become multipliers.
4. Make the calculation. Using the calculator, first multiply by all the multipliers; then divide by all the divisors. The result is the value of the unknown (Figure 6-1).

Proportion

Enlargements and reductions of artwork are always in *proportion* to the original shape. The degree of enlargement or reduction is expressed as a percentage basis. For instance, a photograph 4 inches by 4 inches, enlarged to 200 percent, would measure 8 inches by 8 inches. A page of copy 17 inches by 22 inches, reduced 50 percent, would result in a page of 8½ inches by 11 inches.

Figure 6-2 shows the diagonal-line method of enlargement and reduction. A sheet of tissue is hinged over a photograph. Then a pencil is used to draw an outline on the tissue of the picture and mark the desired size.

Example

Problem: You are given some 10-pitch typewritten copy containing 43 lines with an average line length of 5 inches. This is to be set in a 10-point type with 1-point leading in a 14-pica measure. The specified type sets 2.6 characters per pica.

Find the DEPTH of the type in picas.

Solution: The series of charts on the opposite page demonstrates the four-step procedure for using the typefitting chart. In this example the Full-Chart is applied, with all segments of the chart being used.

STEP 1. Fill in the chart with the known factors.

STEP 2. Determine which factor is unknown.

STEP 3. Fill in the mathematical signs.

STEP 4. Make the calculation.

$10 \times 5 \times 43 \times 11 \div 2.6 \div 14 \div 12 = 54.14$ picas

	Sign	Pitch	Line Length	No. Lines	Type Size + Leading
Typewriter		10	5	43	11
	Sign	**Ch/Pica**	**Measure**	**Depth**	**Pts./Pica**
Type		2.6	14		12

	Sign	Pitch	Line Length	No. Lines	Type Size + Leading
Typewriter		10	5	43	11
	Sign	**Ch/Pica**	**Measure**	**Depth**	**Pts./Pica**
Type		2.6	14	?	12

	Sign	Pitch	Line Length	No. Lines	Type Size + Leading
Typewriter	×	10	5	43	11
	Sign	**Ch/Pica**	**Measure**	**Depth**	**Pts./Pica**
Type	÷	2.6	14	?	12

Figure 6–1

The line between A and B indicates the original size. Lines A to F and A to D represent either reduction or enlargement on a 2:3 ratio, the only ratio for which this method is usable.

A proportion wheel (Figure 6-3) is a device which quickly determines the final size of photographs or art. To use the wheel, first line up the size of the original opposite the desired size. The pointer will then indicate the percentage of the original size or the number of reductions needed.

LAYOUT AND PASTEUP

Laying out copy and pasting it up requires some skill; however, such work does not need to be done by an artist. The result of such work is called a *pasteup* or a *mechanical*. Besides knowing the tools of the trade and the steps to follow, a person who does layout and pasteup must be aware of certain basic design principles (see Figure 6-4).

Diagonal Line Method of Enlargement and Reduction

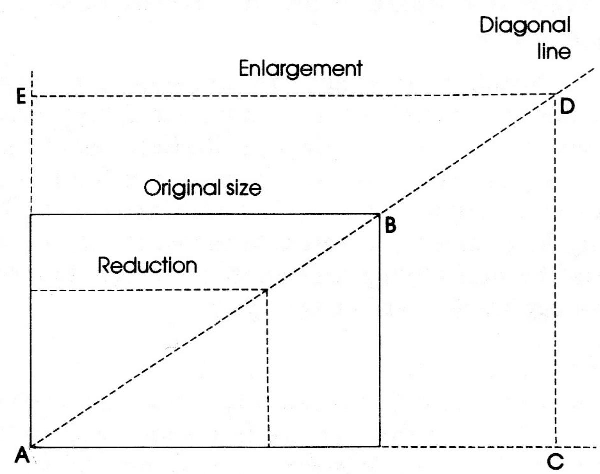


Figure 6–2

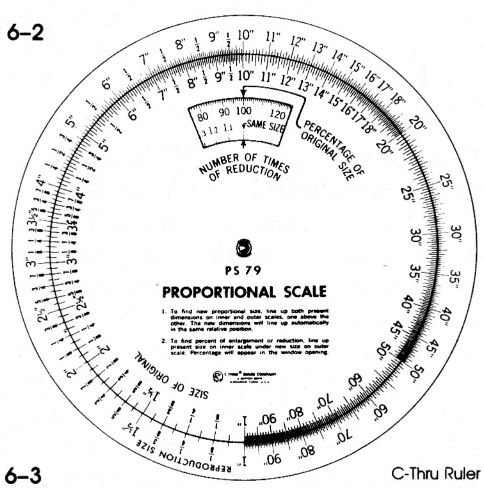


Figure 6–3

C-Thru Ruler Co.

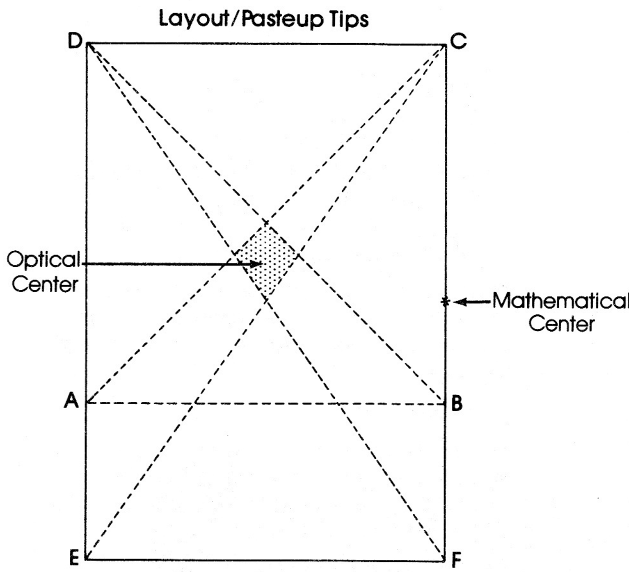


Figure 6–4 Optical and mathematical centers. The optical center gives the copy a balanced look.

Design Principles

The basic design principles involved in layout are *balance, proportion, sequence, unity,* and *emphasis.*

Balance

Any page design must be in balance. Balance is created by placing all the elements on a page in a general sense of equilibrium (that is, the page should not appear lopsided). *Formal* (or *conventional*) balance involves placing the art and type on one or several vertical center lines. This style suggests formality, dignity, and reliability (Figure 6-5). *Informal* balance is more modern. Image masses are placed at random on the sheet. Modern balance is generally more interesting and eyecatching than formal balance (see Figure 6-5).

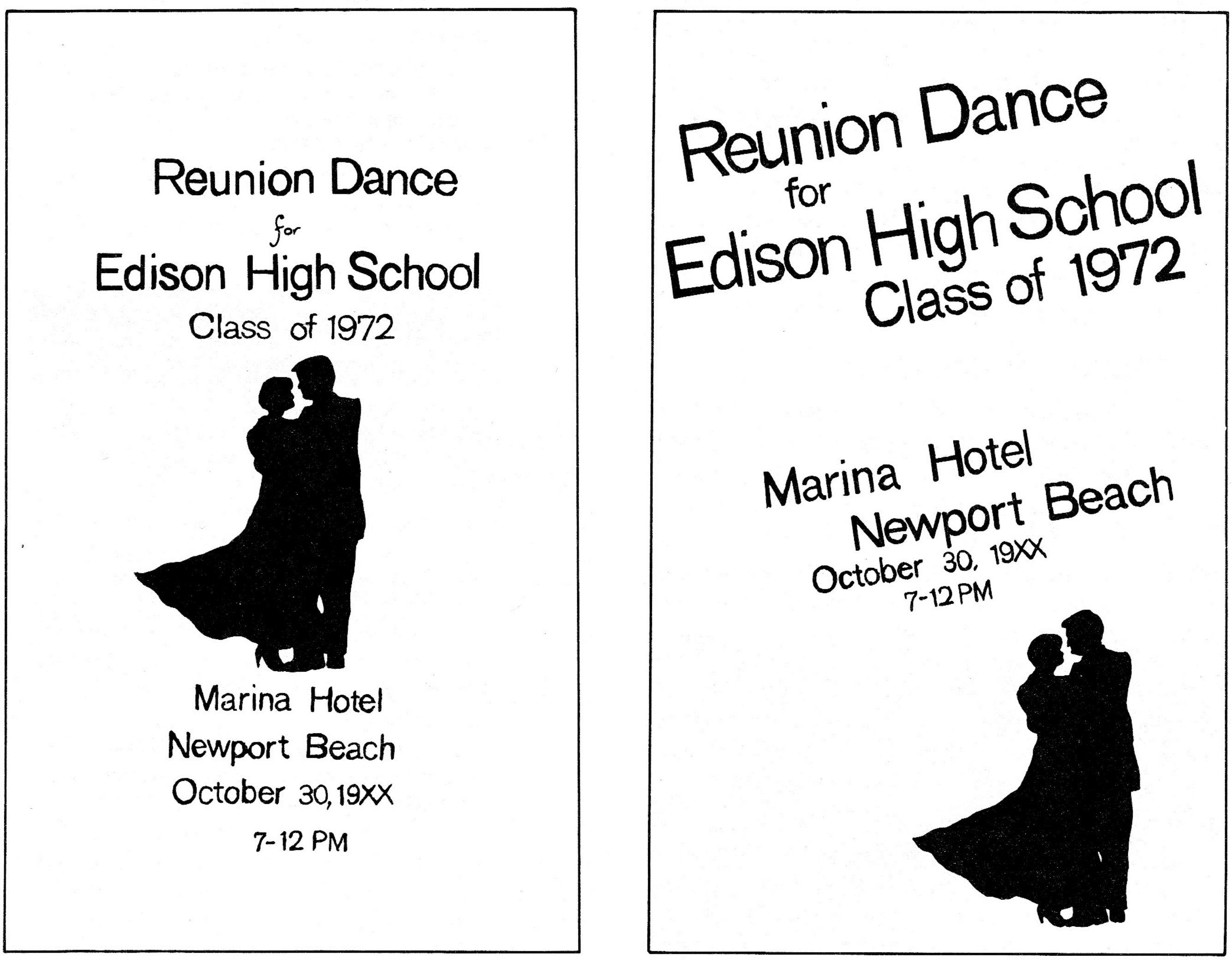


Figure 6–5 Formal balance Informal balance

Proportion

The space within the page should be broken up into pleasing *proportions*. The white space around the edges and within the design is extremely important.

Sequence

A pattern should be evident on every page. Through habit, the eye moves from left to right and from top to bottom; therefore, elements can be placed in a "Z" pattern to direct the reader's eye movements. The eye may also focus in at the optical center of the page and move in a clockwise motion. The eye moves naturally from big elements to little elements, from dark elements to lighter elements, from color to noncolor, from unusual shapes to usual shapes. Sequence at its best can set up a sort of optical rhythm.

Unity

A unifying shape or pattern should hold the page together. A border surrounding the copy is one easy solution. Wise use of white space can also tie the different elements together. The white space at the outside edges of the page can play the same role as a border.

Emphasis

One element, or one part of the page, should dominate all others. This could be the title, the art, or the copy. It should be the most important element—the one you want the reader to notice first.

Typographic Principles

The five principles described in Figure 6-6 will be helpful in choosing the best typefaces and design for the copy you are having set.

Steps in Layout and Pasteup

A layout is a diagram or arrangement of the job to be printed. The pasteup or mechanical is the final product. A designer may go through a series of steps in making a mechanical or pasteup. These steps include a *thumbnail sketch, rough layout, finished layout,* and the final *pasteup* or *mechanical.* Not all of these steps are always needed or desired on all jobs. (See Figure 6-7a, b, and c.)

Thumbnail Sketches

Many designers like to start planning a layout by making several fast, small sketches, called *thumbnails.* Such a sketch gives the designer a chance to experiment with various ideas before going to the work of drawing a layout.

Caps versus Lowercase

MOST PEOPLE FIND THAT THE LOWERCASE LINE HAS A MORE DISTINCT OUTLINE, MAKING THE WORDS MORE QUICKLY RECOGNIZABLE AND MORE COMFORTABLE TO READ.

Most people find that the lowercase line has a more distinct outline, making the words more quickly recognizable and more comfortable to read.

Serif versus San Serif

Serifs not only facilitate the horizontal flow but, small as they are, help to identify the individual letters. They make every lowercase letter unique and more immediately recognizable.

Serifs not only facilitate the horizontal flow but, small as they are, help to identify the individual letters. They make every lowercase letter unique and more immediately recognizable.

Boldface versus Regular

Boldface type can be very effective when used for emphasis or in small quantities. Too much boldface type may inhibit comfortable reading.

Boldface type can be very effective when used for emphasis or in small quantities. Too much boldface type may inhibit comfortable reading.

Black versus White

Reverse type (white on black or on a color) can be attention-getting. However, too much dark background tends to make reading hard.

Reverse type (white on black or on a color) can be attention-getting. However, too much dark background tends to make reading hard.

Spacing

Toomuchortooloosewordspacingorlinespacing (leading)canmakeabigdifferenceinthe legibilityandreadabilityofaparagraph.

Too much or too loose word spacing or line spacing (leading) can make a big difference in the legibility and readability of a paragraph.

Too much or too loose word spacing or line spacing (leading) can make a big difference in the legibility and readability of a paragraph.

Figure 6–6

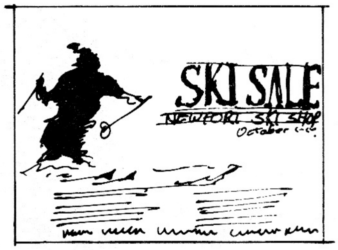


Figure 6–7a Thumbnail sketch.

Figure 6–7b Comprehensive layout.

Figure 6–7c Finished layout.

Rough Layouts

A rough layout (usually called a rough or a pencil) is full-size, but often as crude as a thumbnail sketch. The lettering is done by hand, with no attempt to copy exactly the typeface to be used. Some people prefer skipping the thumbnail sketch and beginning with a rough layout.

Finished Layout

The designer may execute a more finished layout, in which the artwork and photographs are drawn in so that they look like the final copy. The copy area is ruled with parallel lines, to simulate the effect of typeset text.

Comprehensive Layout

A comprehensive layout (or *comp*) is made with great care and shows exactly how the finished job will look. A sample of the copy is set in type and either waxed or glued in place.

A comprehensive layout can be designed and finished on the display screen of a computer, as shown in Figure 6-8. The screen continuously shows the ad as it is being made up. The computer operator uses a stylus (shown on the shelf in front of the screen) to draw the art that is part of the ad.

Pasteup (Mechanical)

A pasteup (or *mechanical*) includes all the finished artwork and corrected proofs of headlines and copy. The finished product is photographed for reproduction (Figure 6-9).

Tools for Pasteup

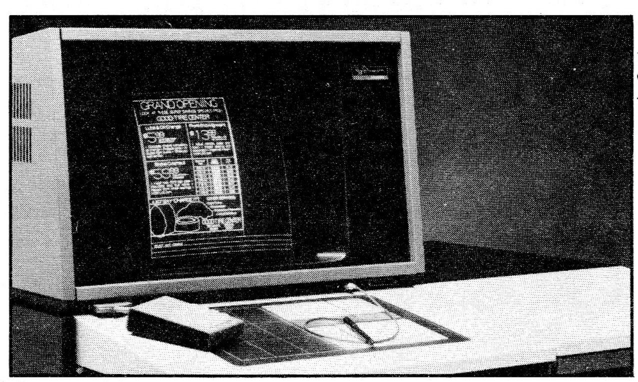
Although many items can be used in pasteup work, only those on the following list are essential for a basic setup (see Figure 6-10).

Paper

Regular sheets of white offset paper (70 lb. works extremely well) can be used for the base sheets. For some work, graph paper with non-reproducible lines helps in placement and centering. Tissue or tracing paper is handy, and the tissue pad will provide a hinge, giving protection to the mechanical.

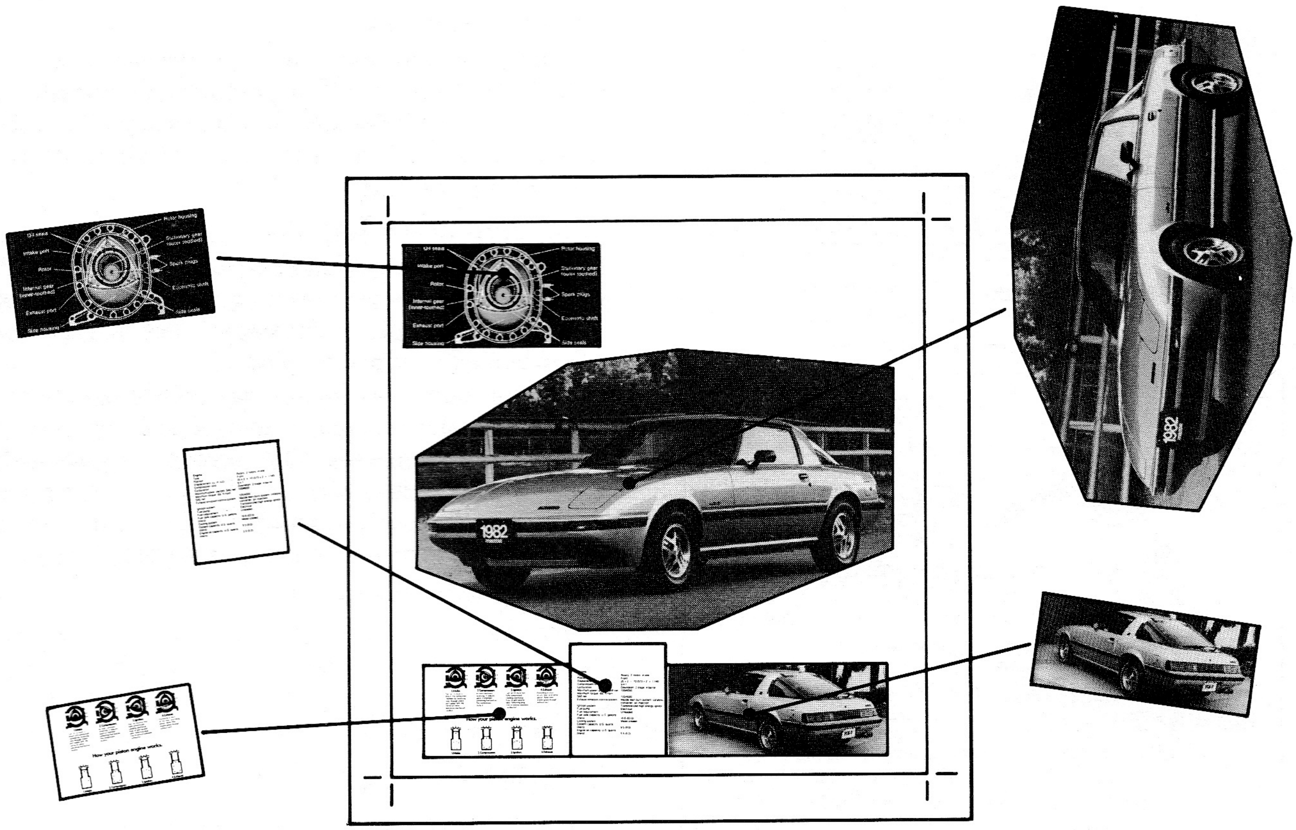
Pasteup Board, T-Square, and Triangle

A pasteup board with a T-square and triangle is a necessity. A small, portable board can work as well as a regular drafting table.



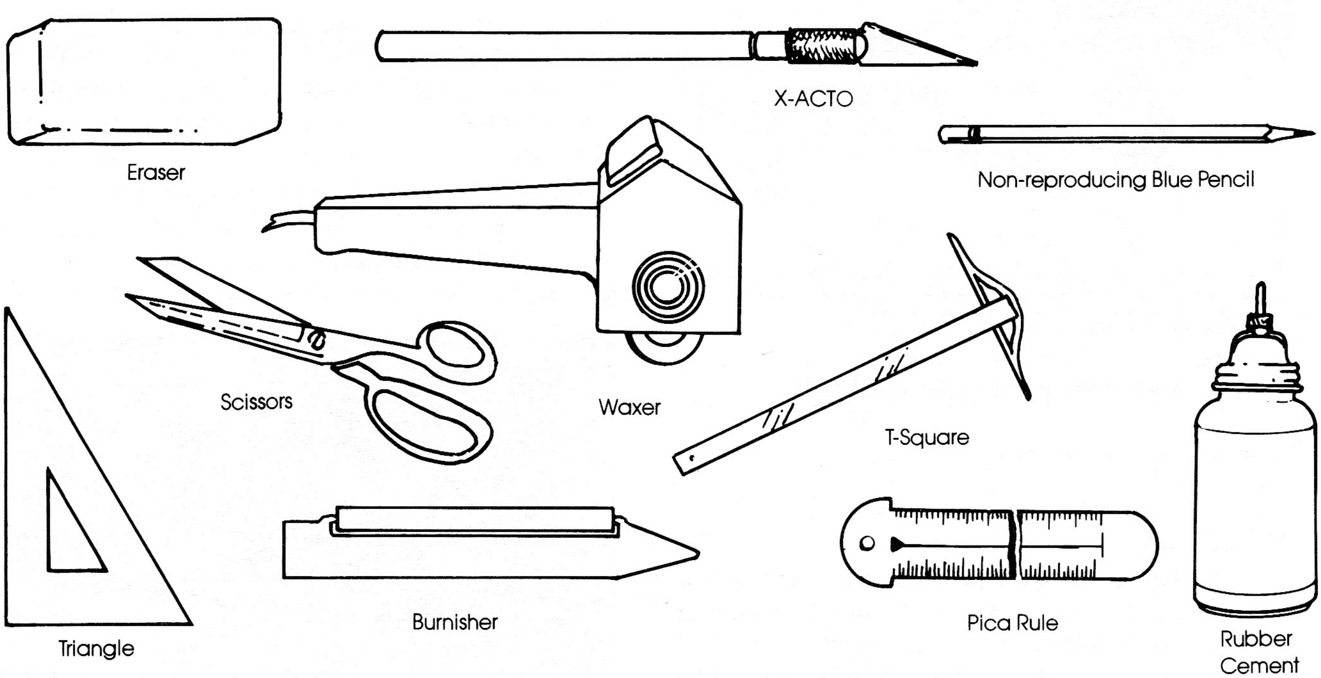
Compugraphic.

Figure 6–8 Compugraphic AdVantage.



Mazda Motors America.

Figure 6–9



Tools of the Trade

Figure 6–10

Pica Rule

A pica rule, a printer's metal or plastic ruler showing picas and points, aids in copy markup and measurement.

Pens and Pencils

Drawing pens, sharp pointed pencils, and a blue nonreproducible pencil are all very useful. Technical fountain pens, such as the Rapidograph, are excellent for pasteup that requires a lot of line work. Using these pens accurately takes practice.

Cutting Devices

Scissors and an X-acto knife with a sharp angled blade are needed for cutting apart and positioning text.

Erasers and Coverup

A soft rubber eraser and opaque white coverup (a kind of paint) both help when correcting mistakes.

Paper Tape

White paper tape has dozens of uses in pasteup work. It can cover up unwanted spots, tape pasteups together, hinge flats, and hold down base sheets on the board. The tape can be written on.

Rubber Cement, Waxer, and Spray Adhesive

Rubber cement is not recommended for pasteup work but is handy to have for some purposes. Once material has been rubber cemented, it is permanently placed. A waxing machine makes pasteup work faster, cleaner, and easier (Figure 6-11). An inexpensive hand waxer plugs into an electrical outlet. When the wax in the machine is hot, it can be applied to the back of a piece of paper. The paper can then be placed on the layout. If the placement is not satisfactory, it can easily be lifted and replaced. A spray adhesive (removable type) can also hold copy for pasteup.

Burnishing Stick or Roller

A burnishing stick or roller is needed for applying waxed copy and rub-on letters or designs.

Rub-On (Transfer) Letters and Designs

Rub-on letters can be purchased in a variety of sizes and typefaces to apply to the mechanical. Designs, borders, and patterns also come on sheets, so that the designer can create designs without having to actually draw them.

Headlining Machines

Headlining machines can set short lines in large typefaces at low cost (Figure 6-12).

Clip Art

Many companies sell copyright-free clip art in books. Permission is granted to the user to cut out and use such material. This procedure saves the person doing the layout and pasteup work much time. In addition, the person does not have to be an artist. Clip art to fit various seasons and holidays, types of occupations, cartoon characters, and so forth can save hours of work and give the mechanical a very professional look.

Templates

Many types of templates are available for tracing circles, squares, flow charts, and numerous designs. (See Figure 6-13.)

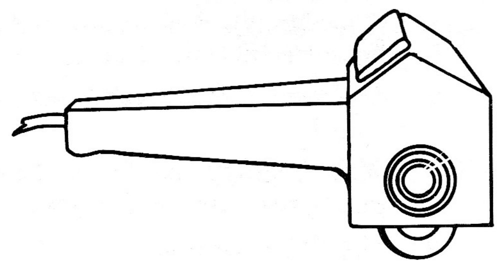


Figure 6–11

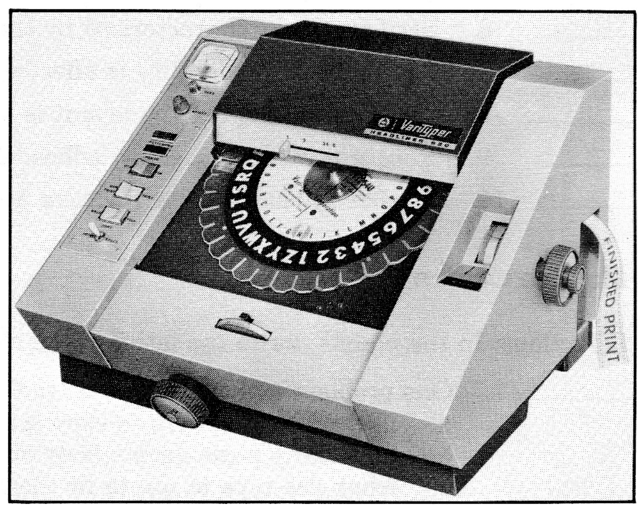


Figure 6–12 AM Varitype Headliner 820.

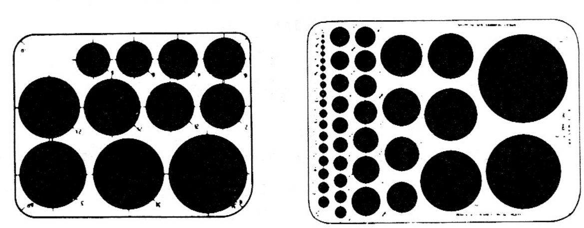


Figure 6–13

Proportion Wheel

A proportion wheel allows a person to dial the size of the mechanical and the final size desired, and then find the percentage of reduction or enlargement needed. (See Figure 6-3.)

Light Tables

A light table allows copy to be traced, and makes it easy to align type and art with ruled guidelines on the base paper.

REVIEW QUESTIONS

True/False

Directions: Write a "T" in the blank if the statement is true, and an "F" if the statement is false.

_______ 1. Copyfitting is determining the amount of manuscript copy that can be fit into a given area for a specified size and style of type.

_______ 2. The number of characters a typewriter types in a line 1 inch long is known as the line length.

_______ 3. With lengthy manuscripts, an estimate can be made of the total number of lines by multiplying the number of pages by the average number of lines on a page.

_______ 4. The five design principles to consider when designing a layout are balance, proportion, sequence, unity, and emphasis.

_______ 5. Boldface type is most effective when used in large quantities.

_______ 6. Serif types are characterized by their clean, modern look.

_______ 7. Legibility or readability is affected by the word spacing or the line spacing (leading).

_______ 8. The final product of the layout is known as a pasteup or mechanical.

_______ 9. Rubber cement is the best adhesive for layout and pasteup work.

_______ 10. A pasteup board and a T-square are a necessity for pasting up and laying out copy.

Multiple Choice

Directions: In the blanks, write the letter of the choice that best completes each statement.

_______ 1. One problem which must be solved when fitting copy is
a. how much typewritten copy is needed to fit a layout in a specified type.
b. how many picas deep a body of type will set in a specified type.
c. what size type to use to fit the typewritten copy to a given layout.
d. what measure to set type in when the depth is inflexible.
e. all of the above.

_______ 2. The distance, measured in picas, from top to bottom of the type area is known as the
a. measure
b. character per pica
c. points per pica
d. depth

_______ 3. A page of copy 8-1/2 × 11 inches, when reduced 50 percent, would measure
a. 4-1/4 × 11 inches
b. 8-1/2 × 5-1/2 inches
c. 4-1/2 × 8-1/2 inches
d. 4-1/4 × 5-1/2 inches

_______ 4. Fast, small drawings which help the designer experiment with various ideas before doing a lot of work are known as
   a. mechanicals
   b. thumbnail sketches
   c. pasteups
   d. comprehensive layouts

_______ 5. A device which allows a person to find the percentage of reduction or enlargement needed is a
   a. template
   b. burnisher
   c. proportion wheel
   d. pica rule

SUGGESTED ACTIVITIES

a. Obtain a copy of *Computer Age Copyfitting* by Leslie Rasberry, and further investigate the skill of copyfitting.

b. Secure five or more flyers or newspaper ads and analyze each. Evaluate them for balance, proportion, sequence, unity, and emphasis.

c. Choose a subject with both artwork and text. Design a rough layout, and if possible do a pasteup.

7
FINISHING PROCEDURES

Objectives

After completing this chapter, you will be able to:

1. Explain the reasons for using color.
2. Discuss the selection of paper sizes.
3. Identify the four general classifications of binding.
4. Name and explain three other considerations in binding.

The last part of copy preparation involves the finishing procedures. After a piece of paper has been printed, its effectiveness depends on the way the printed material is packaged. Color, size, folding, and binding are all considerations in attractive packaging.

COLOR

Color is most effective in setting the mood of a package. Various colors of both paper and ink can be used for adding variety, increasing readability, and directing emphasis.

Reading Ease

Although many people believe important papers should be printed in black ink on white paper, this combination is not the most readable. Black type on a yellow background has the highest legibility. Black on red has the lowest legibility, and certain red-green combinations are actually painful to the eye.

Effectiveness

Studies indicate that the use of a colored or textured paper stock, rather than plain white paper, for direct-mail advertising increases consumer response. The response ranges from 7½ percent to 142 percent, and the return on investment improves more than $800 for every additional dollar spent on the added cost of the colored and/or textured paper.[1]

Coding

A special system of color coding can be established within an office. Brown might always refer to one department, green to another, and blue to another. If carbon copies were used, each department would get carbon paper in its particular color. A memo from the president might always be in blue—with everyone else forbidden to use blue.

SIZE

Paper size is traditionally 8½ × 11; however, printed copies can be ordered in a number of paper sizes—3 × 5, 7 × 10, 8½ × 13 (legal), and so forth.

Odd-Size Paper

Many times a different look or special effect can be obtained by using paper of a size different from the normal. No rule states that all reproduction work

1. Research conducted by Direct Mail/Marketing Association, Inc., 6 East 43rd Street, New York, NY 10017.

must be done on either standard or legal-size paper. Many machines are adjustable for other sizes of paper; if not, the material can always be cut after it is run. However, the paper cutting sizes considered in the next section should be followed for greatest efficiency and economy. One simple variation is to turn the copy so that the short side is to the left, rather than at the top.

Paper Economy

Paper is manufactured in rolls, which are cut into large flat sheets (Figure 7-1). These sheets are much larger than the customary printing sizes. Before or after printing, these large sheets must be cut to the proper dimensions (Figure 7-2). In a print shop, a user is charged for the total amount of paper used, including waste; therefore, to cut without waste is important in conserving both paper and money. The basic sheet size for writing paper is 17 × 22 inches; cover stock is 20 × 26 inches; and book stock is 25 × 38 inches. A paper estimating chart can aid in determining an economical size and in estimating the number of sheets required (Figure 7-3).

Michael Business Machines.

Figure 7-1 Paper cutter.

PAPER CUTTING PROBLEMS

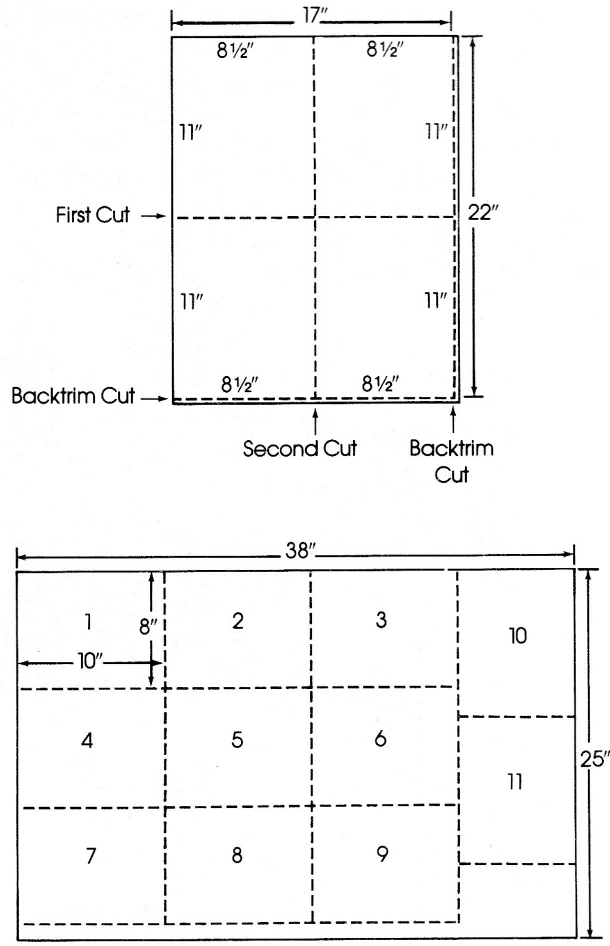


Figure 7-2

Full Sheet	Piece Size	Number of Pieces
22″ × 34″	7 1/2″ × 10 1/2″	9
20″ × 26″	8 1/2″ × 11″	5
28″ × 34″	8 1/2″ × 11″	10
25 1/2″ × 30 1/2″	8 1/2″ × 11″	8
22″ × 28″	9″ × 12″	5

Basic sheet size:
20″ × 26″
Size to be cut:
11″ × 8 1/2″
1 × 3 = 3 pieces
Remaining size:
9″ × 26″
8 1/2″ × 11″
1 × 2 = 2 pieces
Total = 5 pieces from 20″ × 26″ sheet

Figure 7-3

Folding

Books, magazines, pamphlets, and brochures must be *folded* before they are *trimmed* to their final dimensions. Folding styles are shown in Figure 7-4. The large folding machines in printing plants are actually *finishing* machines. They *fold* the printed sheets to the proper size, *score* them for easier cutting, and *slit* them into smaller sheets. They can also *glue* on covers and *perforate* pages or coupons that are to be torn out (Figure 7-5). Paper joggers are helpful in stacking paper stock evenly (Figure 7-6).

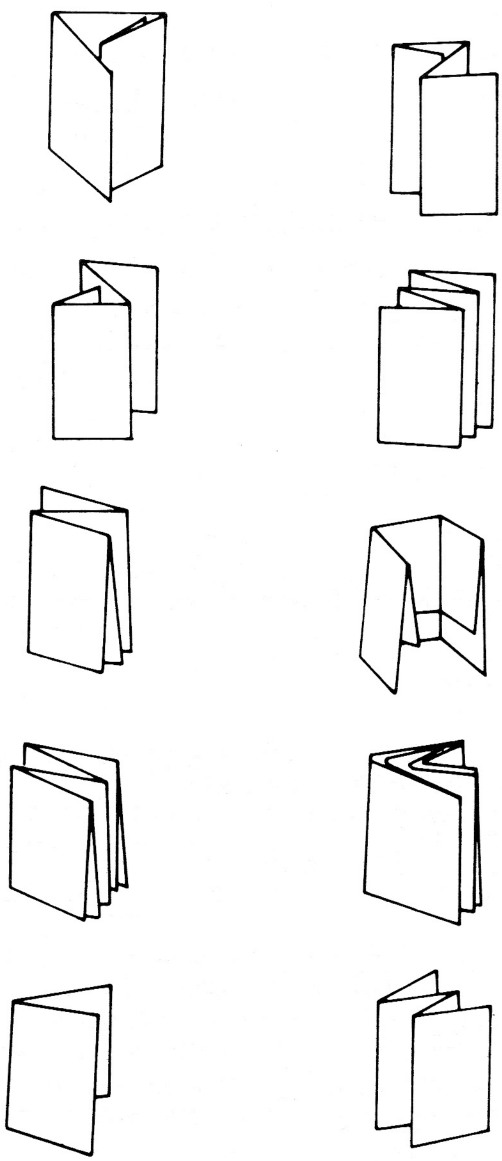


Figure 7–4 Styles of folds.

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Figure 7–5 Folding machine.

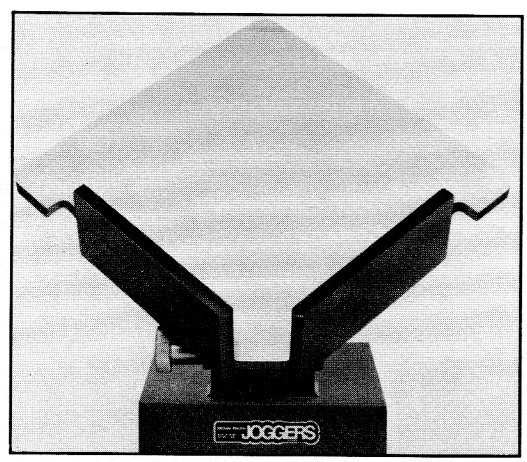

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Figure 7–6 Jogger.

BINDING

Pages of multiple documents can be sorted out or *collated* by the user of a *collator* (Figures 7-7a and 7-7b). Informal documents or reports may be *stapled* (Figure 7-8). *Binding* is used to fasten pages together permanently in an attractive package. The most common binding methods are *wire stitching, sewing, perfect binding, loose-leaf fastening,* and *mechanical fastening*.

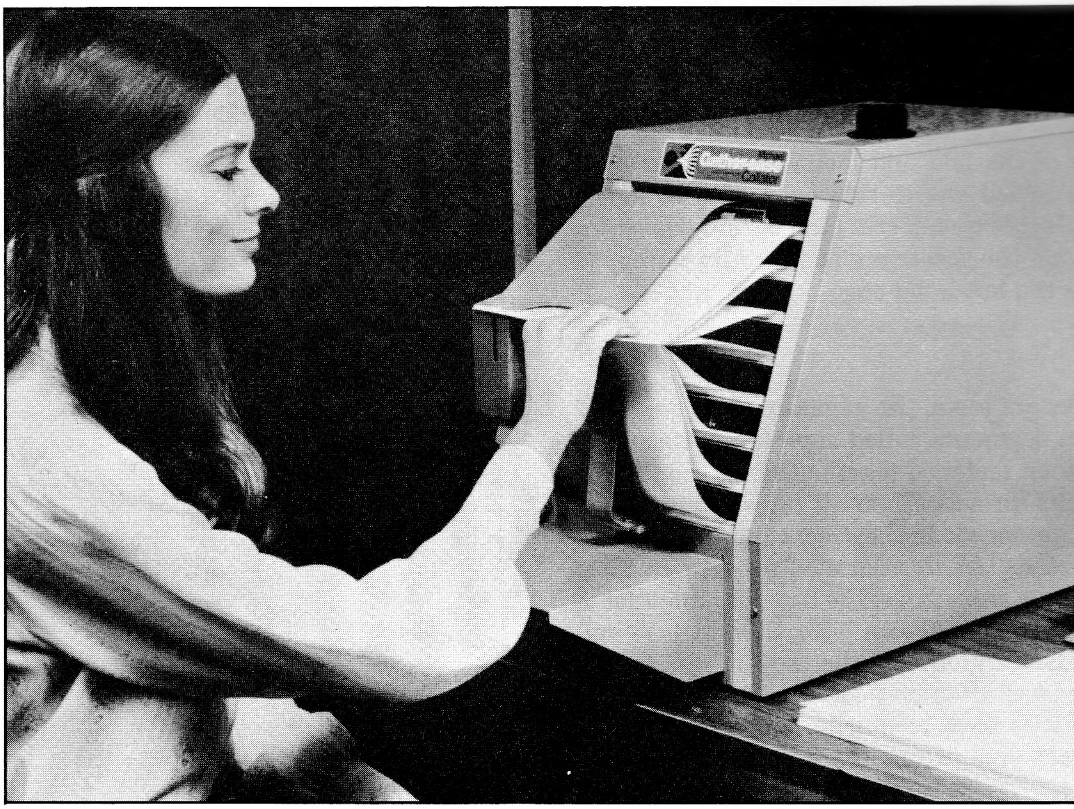

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Figure 7–7a Gather-ease desk top collator.

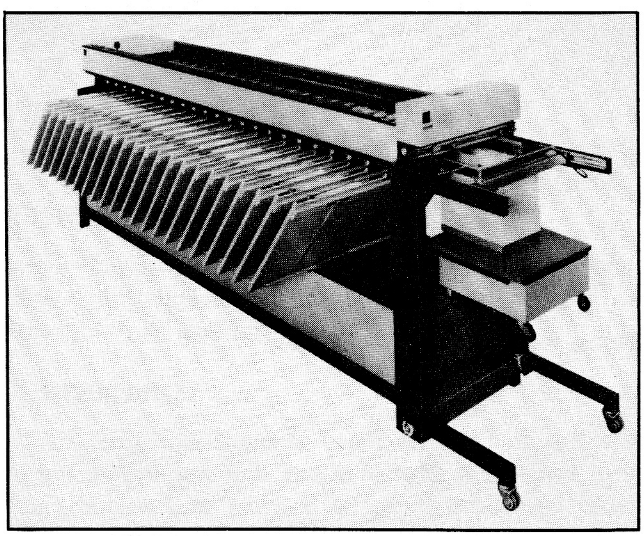

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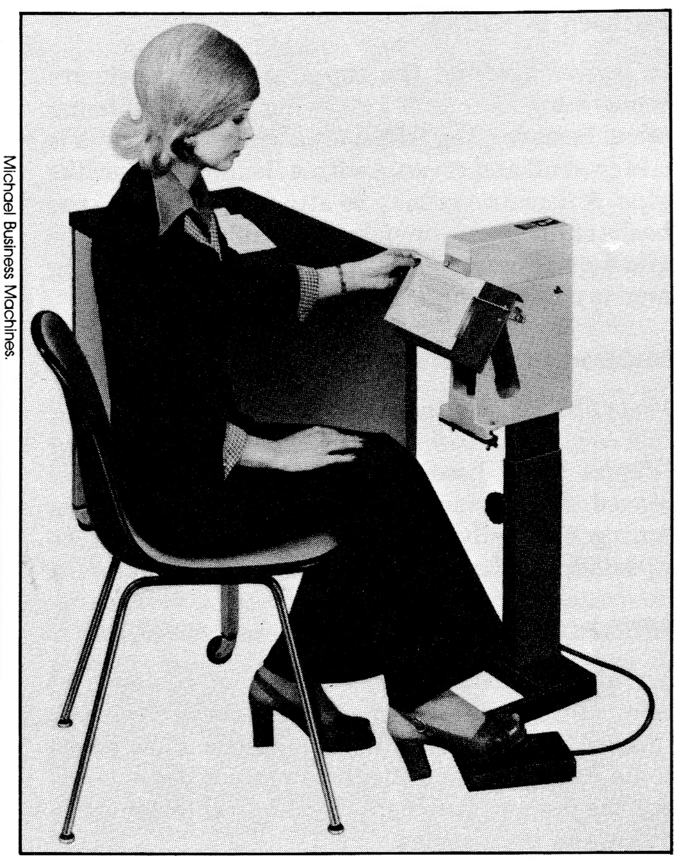
Figure 7–7b Standard station collator.



Michael Business Machines.

Figure 7–8 Electric stapler.

Wire Stitching

Wire stitching is the simplest form of binding. There are two kinds of wire stitching (Figure 7-9). In *saddle stitching,* the folded sheets are opened to the center of the fold and fastened together by a wire. (The folded sheets ride on a kind of metal *saddle* while this type of stitching is being done.) In *side stitching,* the sheets are fastened from front to back along the left-hand edge.

Sewing

When books are sewn, the pages are first gathered together in segments called *signatures.* Each signature is then fastened together along the fold by three or four threads. Then all the signatures are fastened together along the sewn edge, using interlocking threads. At this point, if a paper cover is glued on to the signatures, the book or pamphlet is said to be *soft sewn* (Figure 7-10). If endpapers and cover boards are glued on, the book is *case bound* or *case finished* (Figure 7-11). Because sewing is expensive, it is used primarily for books that receive a great deal of use, such as textbooks and dictionaries.

Perfect Binding

In *perfect binding,* the signatures of a book are brought together as if for sewing. Instead of being sewn, however, the folded area of the signatures is trimmed off and covered with a flexible, rubberlike glue. A paper cover may be attached directly to the backs of the pages, or endpapers and boards may be glued on (Figure 7-12). The book you are reading now is *perfect-bound.*

Loose-Leaf Fastening

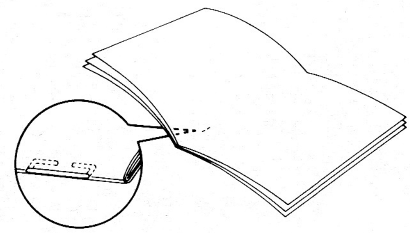
Posts and rings, either in stiff binders or with flexible covers, are two methods of *loose-leaf fastening* (Figure 7-13). Loose-leaf pages can easily be removed and replaced. This makes loose-leaf fastening especially useful for works that must be updated, such as handbooks and service manuals.

Mechanical Fastening

Spiral and *plastic* fasteners, and methods such as *velo* binding are all forms of *mechanical fastening* (Figure 7-14). Many of these methods allow pages to lie flat, but it is difficult to replace pages without the proper equipment. Mechanical fastening is quick and inexpensive.

BINDING

WIRE STITCHING



Saddle stitching

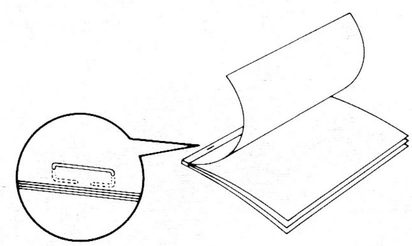


Figure 7–9 Side stitching

SEWING

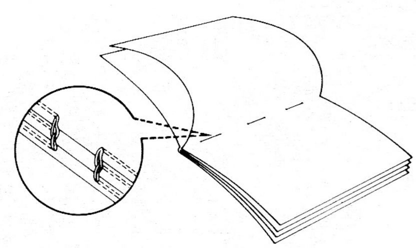


Figure 7–10 Soft sewn

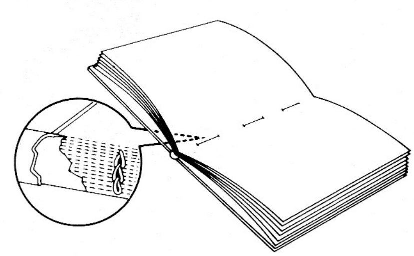


Figure 7–11 Case bound

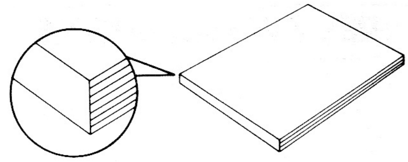
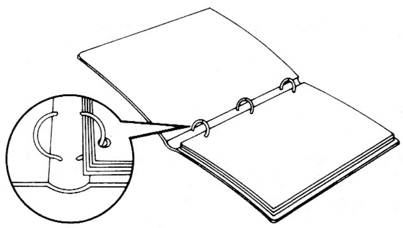


Figure 7–12 Perfect binding

LOOSE-LEAF FASTENING



Ring fasteners

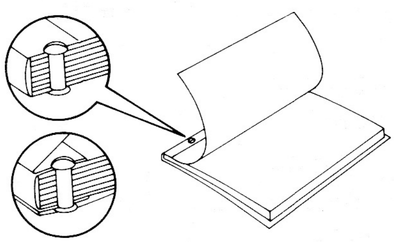
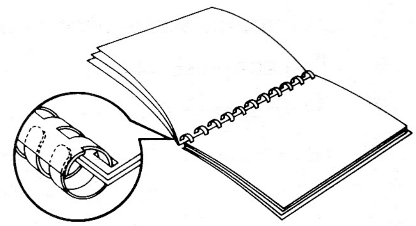


Figure 7–13 Post fasteners

MECHANICAL FASTENING



Plastic fastening

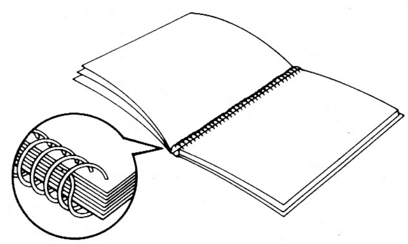


Figure 7–14 Spiral fastening

OTHER BINDING OPERATIONS

Other binding operations that may be used in company publications are embossing, die-cutting, or shrink-wrap packaging.

Embossing

Embossing uses heat to press a raised image into a piece of paper. The image may be printed as well as embossed, or it may be *blind* embossed only. This technique is particularly effective for business cards or letterheads where the name or emblem is made to stand out.

Die-Cutting

Die-cutting is the cutting of designs in paper, using a sharp printing die. This process is performed on a letterpress or die-cutting press. Die-cut windows in a page can allow words or pictures to show through from the next page. This technique is often used for sales brochures.

Shrink-Wrap Packaging

In *shrink-wrap packaging,* the finished product is wrapped in a see-through polyethylene film which is heat-sealed around the package. Hundreds of printed brochures or reports may be shrink-wrapped together for shipping, or an individual publication may be shrink-wrapped for protection against dirt and wear. Often a company will assemble different items (for example, a catalog, a brochure, a price list, and an order form) and shrink-wrap them into a single package for presentation to customers.

REVIEW QUESTIONS

True/False

Directions: Write a "T" in the blank if the statement is true, and an "F" if the statement is false.

_______ 1. The texture of paper does not have much effect on the appearance of the final product.
_______ 2. Colored paper can be used as a coding device for documents in an office.
_______ 3. Paper can easily be cut to any size or shape without waste.
_______ 4. Printing is most effective on 8-1/2 × 11 sheets of paper.
_______ 5. In manufacturing, the basic sheet size of writing paper is 17 × 22 inches.
_______ 6. The simplest form of binding is wire stitching.
_______ 7. Sewing books is an easy and inexpensive process.
_______ 8. In perfect binding, the pages are held together with glue.
_______ 9. Spiral binding makes it easy to add and remove pages.
_______ 10. Die-cutting presses a raised image into a sheet of paper.

Multiple Choice

Directions: In the blanks, write the letter of the choice that best completes each statement.

_______ 1. The most readable combination of colors is
a. black on white
b. white on black
c. black on yellow
d. black on red

_______ 2. The use of colored or textured paper for advertising brochures
a. is an unjustified expense.
b. increases consumer response.
c. has no effect on consumers.
d. repels consumers.

_______ 3. Posts and rings are a form of
a. loose-leaf fastening
b. perfect binding
c. saddle stitching
d. spiral binding

_______ 4. In manufacturing, the basic sheet size of cover stock is
a. 8-1/2 × 11 inches
b. 17 × 22 inches
c. 20 × 26 inches
d. 25 × 38 inches

_______ 5. Large folding machines can
a. score
b. slit
c. perforate
d. all of the above

SUGGESTED ACTIVITIES

a. Visit a bindery or print shop, or the reprographics center of a large company, and observe the finishing processes in use.
b. Obtain one example of each kind of binding described in this chapter, and report on them to the class.
c. Collect several four-color advertisements from magazines or other sources and describe to the class the effectiveness of the use of color in these ads.

Part III

REPRODUCTION PROCESSES

8
COPIERS

Objectives

After completing this chapter, you will be able to:

1. Describe the two basic processes by which copiers work.
2. List and describe briefly the four dry processes of photocopying.
3. List and describe briefly the four wet processes of photocopying.
4. Discuss the effect microprocessors have had on copiers.
5. Discuss the effect fiber optics and lasers have had on copiers.
6. List and explain the three types of toners.
7. Name and explain several of the features and attachments for copiers now available.

Copiers are designed to make one or more copies of an existing document without preparing a special master. Because of rapidly advancing technology, copiers are now commonplace in the office. The worldwide copier industry had income over $14 billion in 1980, and this industry is predicted to grow at an annual rate of about 18 percent. A total of 1.1 million copier units were placed in offices during 1980. The total number of copiers now in use in the world is over 3 million, producing 350 billion copies a year.

BASIC COPIER PROCESSES

Copiers are usually classified according to the chemical and physical processes by which they work. They can be divided into *dry* and *wet processes,* depending on whether or not liquid chemicals are used (and sometimes, if they are used, according to whether a fresh copy is damp or dry).

Dry Processes

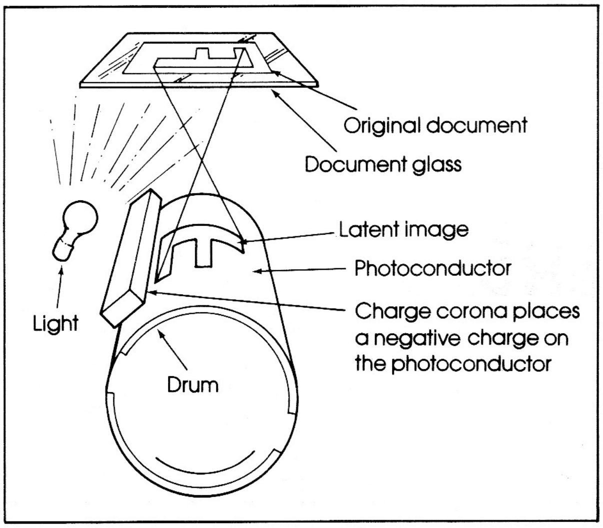
The dry copier processes consist of *electrostatic, dual spectrum,* and *thermal.*

Electrostatic

Two different forms of electrostatic copiers are available—*transfer electrostatic,* usually called *xerography,* and *direct electrostatic.* The essential difference between the two is that xerography uses plain paper, while direct electrostatics uses paper coated with zinc oxide.

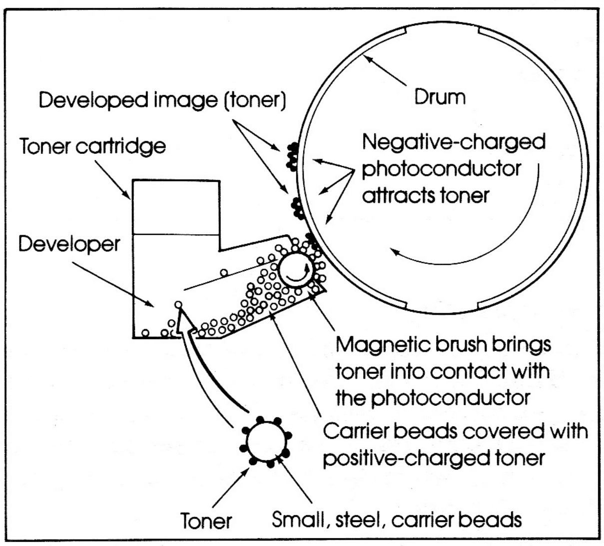
Transfer or Xerographic. In the transfer or xerographic process, the image of the original document is transferred to a photo-conductive material (for example, a specially treated metal drum) by means of a positive electrical charge. The material is then covered with carbon particles that adhere to the image area alone. The image is transferred to the copy paper by a negative charge, and then permanently fused with heat (Figure 8-1a, 8-1b, 8-1c). A few xerographic machines use a liquid toner, but most use a dry toner. Modern xerographic copiers can use any paper, including letter-quality bond papers.

Direct. The direct, or coated-paper, process is simpler than the electrostatic. The image is placed directly onto the copy paper, cascaded, and fused.



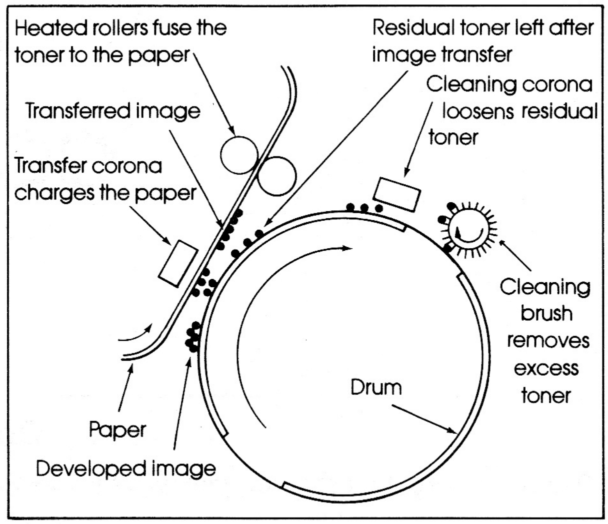
Charging the photoconductor and illuminating the original document causes a latent image to be formed on the photoconductor, which, in this illustration, is a drum.

Figure 8–1a



Carrier beads covered with positive charged toner are attracted to negative charged photoconductor areas.

Figure 8–1b



The image is transferred onto charged paper (unless the paper itself serves as the photoconductor and already contains the image) and made permanent through a fusing process. Any residual toner remaining on the photoconductor after the image transfer is loosened and removed by a cleaning brush and then returned to the toner cartridge for reuse.

Figure 8–1c

Where the light from nonimage areas strikes the copy paper, the charge is dissipated, but the *latent image* remains. This invisible image is then brushed or sprayed with *toner,* which clings to the charged area and thereby develops the image.

The disadvantage of the direct method is that the paper is heavy and greyish, unpleasant to handle or to read from, permanently electrically sensitive, and can only be used on one side. A metal paper clip or ring will mar the copy with black marks. Some direct copiers use a dry toner, but most use a liquid toner.

A newly developed technique is available for low- or middle-volume copying. Called *cold-pressure fusing,* it makes copies without heat to fuse the toner, or ink, to the paper. Cold-pressure fusing reduces the need for service calls, ensures more consistent copying quality, and reduces power consumption by eliminating the time spent warming up the machine (see Figure 8-2).

Dual Spectrum

The dual spectrum process requires two kinds of copy paper to produce each duplicate—an intermediate, light-sensitive paper, and a coated, heat-sensitive final copy paper. First, the original and the intermediate copy paper are exposed to ultraviolet light, creating a latent (invisible) image on copy paper. The original is not used after this step. The intermediate paper (with the latent image) and the copy paper are exposed to infrared heat, transferring the final image to the second copy paper (Figure 8-3).

Figure 8–2 3M 379 copier with cold-pressure fusing system.

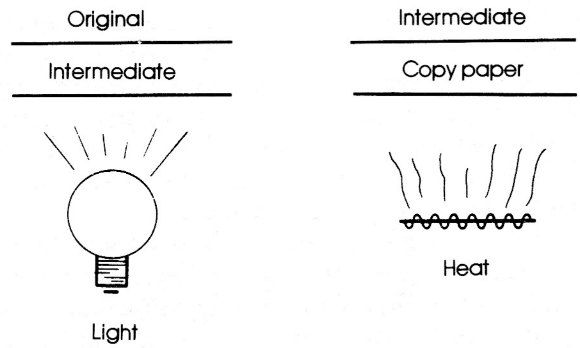


Figure 8–3 Dual spectrum process.

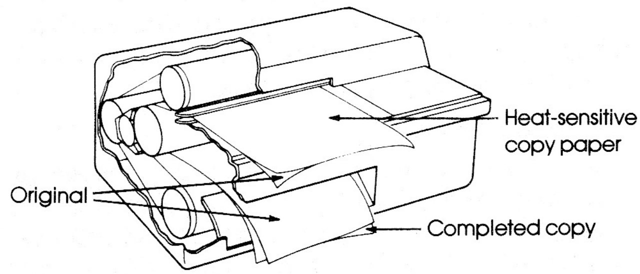


Figure 8–4 Thermal process.

Thermal

The thermal process operates on the principle that dark substances absorb more heat than do light substances. This process is also called *thermographic, thermofax,* or *heat transfer*. A heat-sensitive paper and the original are inserted together into the exposure opening. Inside the copying unit, these sheets are exposed to infrared light. This light generates heat on contact with the dark portions of the original material. This heat, in turn, turns the copy paper dark in corresponding locations, producing a copy of the original (Figure 8-4).

Thermal paper has a waxlike finish and will not copy materials that do not readily absorb heat. This creates a severe limitation, because the process will not copy ball-point and fountain pen inks, rubber stamps, fluid processing reproductions, or most colored inks.

Although copies made on thermal paper may last indefinitely, they are sensitive to heat and tend to become brittle; therefore, copies made by the thermal process are not recommended for permanent files.

Wet Processes

Wet, or moist, processes include *diazo, diffusion transfer, dye transfer,* and *stabilization*.

Diazo

The diazo process uses a copy paper that is coated with light-sensitive chemicals. Typing or drawing on a translucent original creates opaque images. When the original is run through a diazo machine, the chemical coating on the copy paper is destroyed everywhere except where these opaque images have blocked the light. The developing process then converts the remaining chemical on the copy paper into a readable duplicate of the original (Figure 8-5). Three kinds of developing agents are used: liquid, ammonia, or heat.

The document being copied must be translucent; that is, light must be able to pass through it readily. Bond, ledger, and tag cannot be used as originals. Drawings or text on vellum or linen can be copied very successfully by the diazo process.

Another essential requirement of documents to be copied by the diazo process is that they have writing or drawing on one side only. Since the ultraviolet light is projected through the translucent paper, an original with writing on two sides would reproduce the images from both sides, resulting in an illegible copy.

The writing or image on the original must be as near to completely opaque as possible. Mylar, polyethelene, and fabric ribbons that are specially inked for diazo are best. To increase opaqueness on

the original, a wax or carbon backing material may be placed facing the back of the original. The substance will adhere to the back of the original copy, creating a more opaque document for reproduction. The best backup carbon is the film carbon (mylar), which lasts longer, gives a sharp impression, and is easy to erase. An orange "tracing carbon" is still commonly used, although it is not as desirable as the mylar. Standard wax carbon does not adhere to vellum very well; its use results in uneven intensity of typed characters. Some inks and colors transmit light and do not produce acceptable copies. Examples of these are the inks of ball-point pens and the lighter shades of blue.

Diazo machines vary greatly in size. Some are more than 40 feet wide and are used to duplicate materials such as blueprints. Others are small enough to fit on the top of a desk.

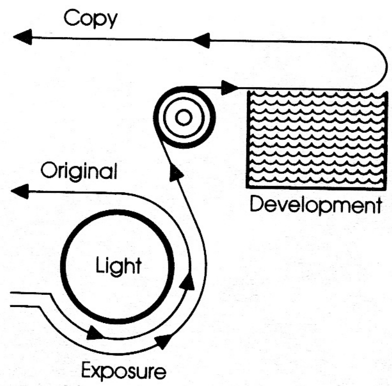


Figure 8–5 Diazo process.

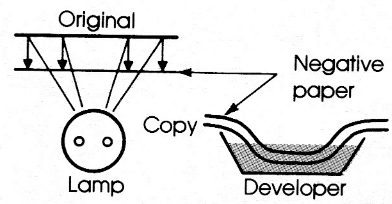


Figure 8–6 Diffusion transfer process.

Diffusion Transfer

The diffusion transfer process is also known as *silver transfer* or *photo transfer*. In this method the original and a negative paper are placed together and rolled around a filtered lamp. Within the machine, light goes through a sheet of photo paper and is reflected from the original to expose the negative. The operator then puts the negative and a sheet of positive sensitized paper into the developer together. The action of the developer fluid and the pressure of the rollers transfer the image from the negative to the positive paper. Both pieces of paper are emitted from the machine slightly wet, but they dry in a few minutes. When they are peeled apart, the negative sheet is discarded and cannot be used again. Although the process sounds complicated, the equipment is usually quite compact and some machines perform all the steps in a single operation (Figure 8-6).

Dye Transfer

The heart of the dye transfer process is the sensitized master—often referred to as a *matrix*. To make a copy, the master is exposed to the original by incandescent light and then immersed in an activator solution for development. After development, the master is placed in contact with ordinary paper and passed through squeegee rollers. The pressure of the rollers causes part of the dye image to transfer from the master to the unsensitized copy paper. The master and copy paper are then peeled apart (Figure 8-7).

Two kinds of masters are available—single and multiple-copy. To make several copies of the same original, the multiple-copy master is reinserted in the activator solution, placed in contact with the

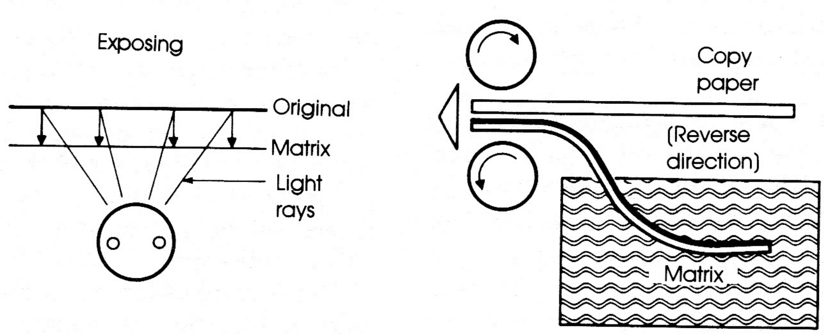


Figure 8– 7 Dye transfer process.

copy paper, squeegeed, and peeled apart for each copy desired. Each time a copy is made from a master in this way, part of the gelatin dye that forms the image on the master is transferred to the unsensitized copy paper. It is difficult to reproduce more than ten copies from a single master. Dye transfer machines are no longer widely used.

Stabilization

The stabilization process uses a sheet covered with a silver-sensitive emulsion combined with a developing agent. The original copy is exposed to this sheet, which is then run through a solution that activates the developing agent. The resultant image is then fixed by running it through a stabilizer (Figure 8-8). The stabilization machine actually accomplishes the familiar process of photographic development, but without the need for further processing.

The image obtained may be a reverse negative or a *right-reading* negative. A reverse negative must be re-run through the machine with a second copy sheet to produce a positive copy. The first copy is white on black, from which any number of black on white copies can be made.

The stabilization process is rarely used today because of the high copy costs and the complicated steps required. Birth certificates, marriage certificates, and death certificates used to be commonly reproduced through this process of white printing on black copy paper.

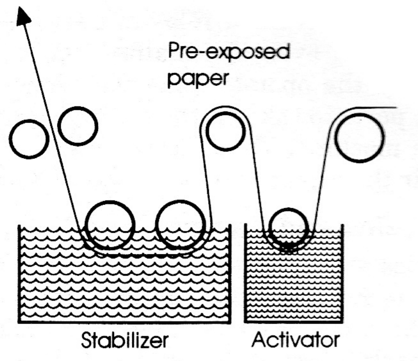


Figure 8–8 Stabilization process.

CURRENT DEVELOPMENTS IN COPYING

Copiers play an integral role in virtually every business establishment today, enhancing both the speed and scope of document communications and records maintenance. As a result, technology has advanced rapidly, making many more features and attachments available. These developments require less interaction with the machines than ever before.

Technology

Modern copier technology offers increased productivity. Improved machine reliability, ease of operation, self-diagnosis, lower costs, greater energy savings, greater versatility, and higher copy quality are a result of the introduction of *microprocessors, fiber optics, lasers,* and improved supplies in the copier market.

Microprocessors

Microprocessor controllers (that is, miniature computers) provide users with better copy quality as well as with reduced downtime. A keypad control panel can serve as a copy quantity selector, copy countdown mechanism, and interrupt mode (see Figure 8-9). Several machines also offer microprocessor logic to identify problems which the

Toshiba.

Figure 8–9 Toshiba BD-3201 plain paper copier with keypad control panel.

operator can either fix or relay to a service technician. Therefore, even if a malfunction cannot be corrected by the operator, the technician can be told what parts to take on the service call in order to fix the machine. Thus, extra trips to diagnose and repair the copier may be saved.

Fiber Optics and Lasers

Fiber optics was introduced into copiers in 1978. This new technology affords reduction in the size and weight of copiers, increased copy quality, and greater machine reliability (since there are fewer moving parts). (See Figure 8-10.) Fiber-optics copiers replace the conventional groupings of mirrors and lenses, used to transmit an image to a photo-receptive drum, with a fiber-optic wafer. This wafer is composed of many thin glasslike rods of high light-transmitting capacity. When bundled together, these rods act as a flexible light guide.

Laser technology and its uses extend from surgery to defensive and offensive weapons to office equipment. In printing, the laser, a beam of pure red light, is used to shape characters on a photosensitive surface. A toner then transfers the image to paper. Laser imaging is accomplished one line at a time; that is, characters and halftones are generated dot by dot. Scanning resolutions are 700 to 1,500 lines per inch. Exposure time is measured in square feet per minute. A typical exposure rate may be from 0.1 to 5 square feet per minute.

Laser-based imaging systems combine a number of advantages in

1. Eliminating the need of costly silver-based imaging products.
2. Imaging more rapidly for a variety of output materials and media.
3. Producing higher quality work.
4. Increasing productivity and decreasing turnaround time.
5. Reducing intermediate production steps and materials.

Fiber optics and lasers can help reduce manufacturing costs of copiers and have already made the intelligent copier a reality (see Chapter 15).

Toners

Toners have a great effect on the appearance of copier output. Certain variations in their formulation can alter image sharpness, reduce or increase smuding, and directly affect machine maintenance. The three major types of toners used today are *two-component powders, one-component powder,* and *liquid mixes.* Resins (polymers) act as the bonding agent for all chemical constituents in toners. These polymers have a lot to do with the performance of toners and the appearance of the resulting copy.

Two-Component Powders. The two components in this type of powder are the *carrier* and the *toner.* Electrostatic attraction causes the fine toner particles to jump from the carrier bead to the photo-receptive drum or copy sheet, thus completing the development process. At present, the two-component powders are the most widely used toners (Figure 8-8).

One-Component Powders. A one-component powder (also known as monocomponent powder) consists of magnetic particles which act as their own carrier. The *one-component powder* combines the toner, plus the necessary carrier and bonding agent into a single powder. One-component development was first introduced in 1972 and represented a major step forward in electrostatic imaging.

Liquid Toners. Liquid electrostatic toner is dispersed in a carrier fluid, an insulating liquid called a *dispersant.* Individual toner particles are held in stable suspension, yet they can be precipitated from the carrier fluid and deposited in the charged image areas of a photoreceptive layer.

Features and Attachments

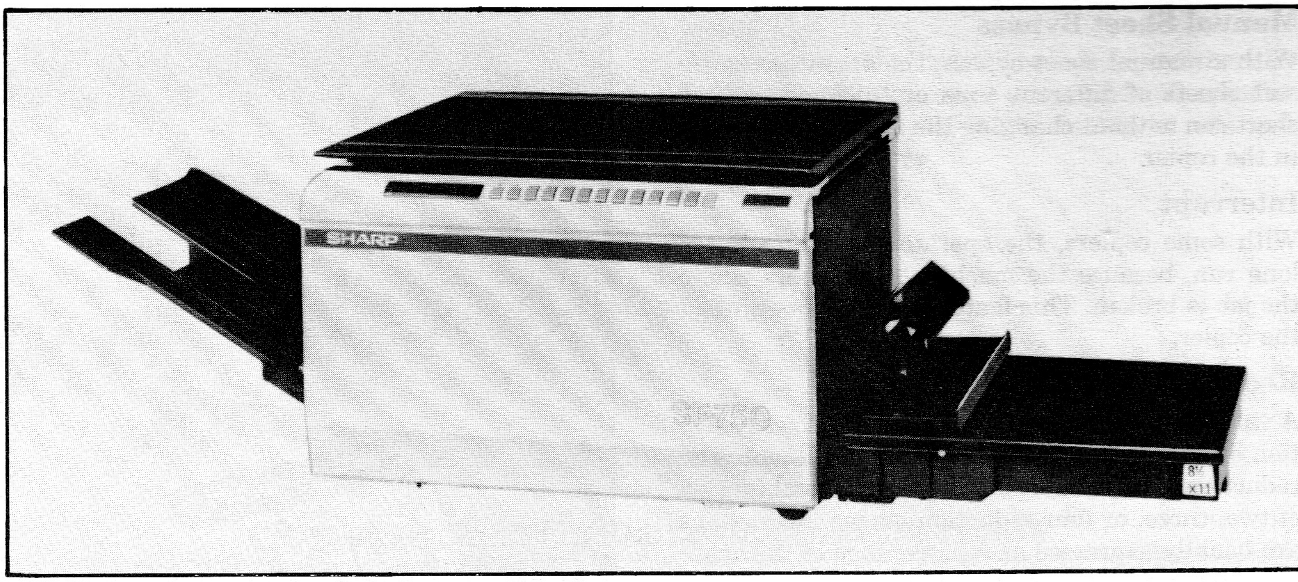
An array of copier features and attachments can decrease labor costs and increase productivity. Reproduction, which traditionally had to be sent to a central reproduction area, print shop, or art department, can now be handled on decentralized office copiers. Feature and attachments which can now be found on today's copiers include the following.

Roll-Stock Copy Paper

Roll-stock copy paper is fed off large rolls as required by the copier, which cuts the paper to the specified length. This feature saves paper and allows faster and more flexible changes of paper length.

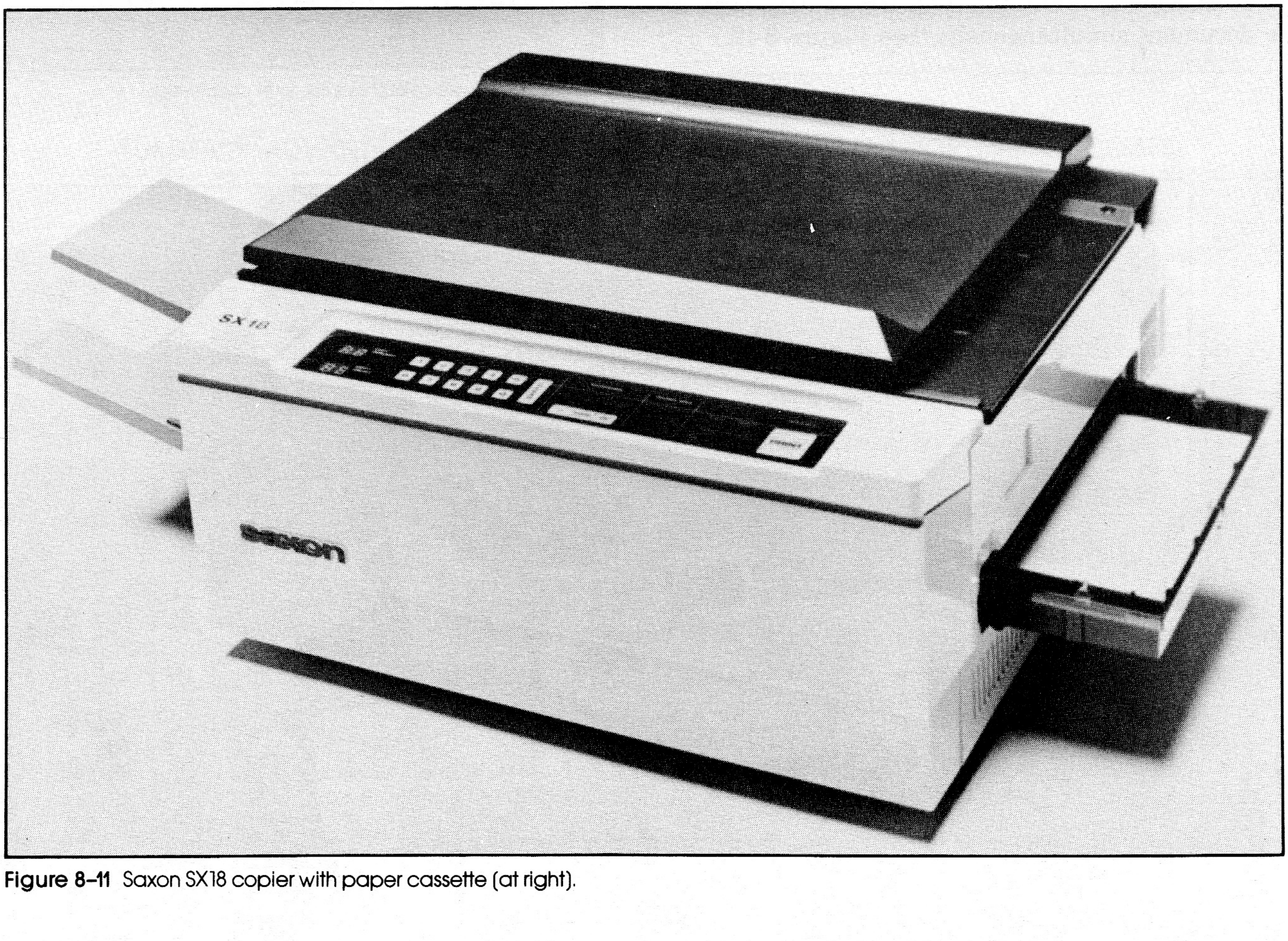
Paper Cassettes and Removable Paper Trays

Paper cassettes and removable paper trays allow for faster loading and size changes. Paper capacity is increased with multiple cassettes. (See Figure 8-11.)



Sharp.

Figure 8–10 Sharp SF-750 copier with fiber optics system.



Saxon.

Figure 8–11 Saxon SX18 copier with paper cassette (at right).

Manual Sheet Bypass

With a manual sheet bypass, the operator can insert sheets of different sizes or thicknesses for a short run without changing the main paper supply in the copier.

Interrupt

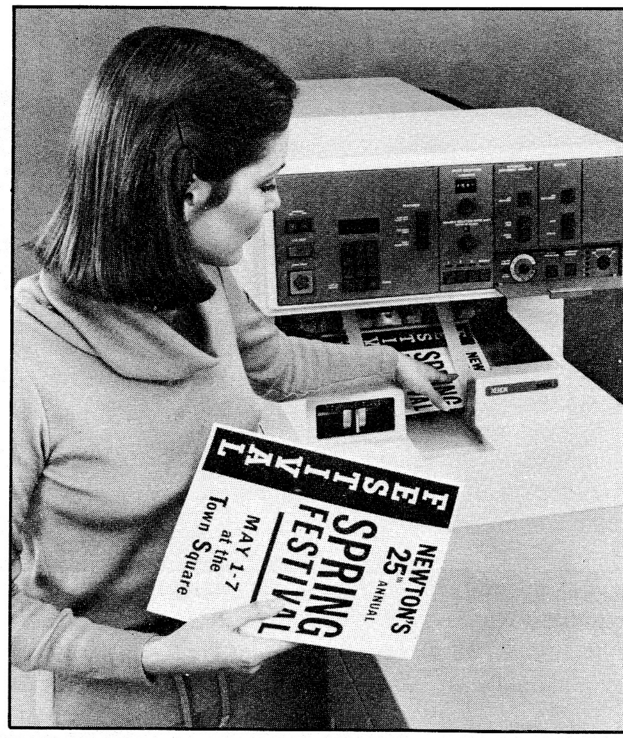
With some copiers, the operator can interrupt a long run, because the machine remembers where the job is broken. This feature reduces queuing at the copier.

Reduction and Enlargement

A variable zoom lens on some copiers allows reduction or enlargement of an original document. The reduction feature offers either one or a combination of two, three, or four reduction stages. Reductions are usually expressed as a percentage of the original copy size.

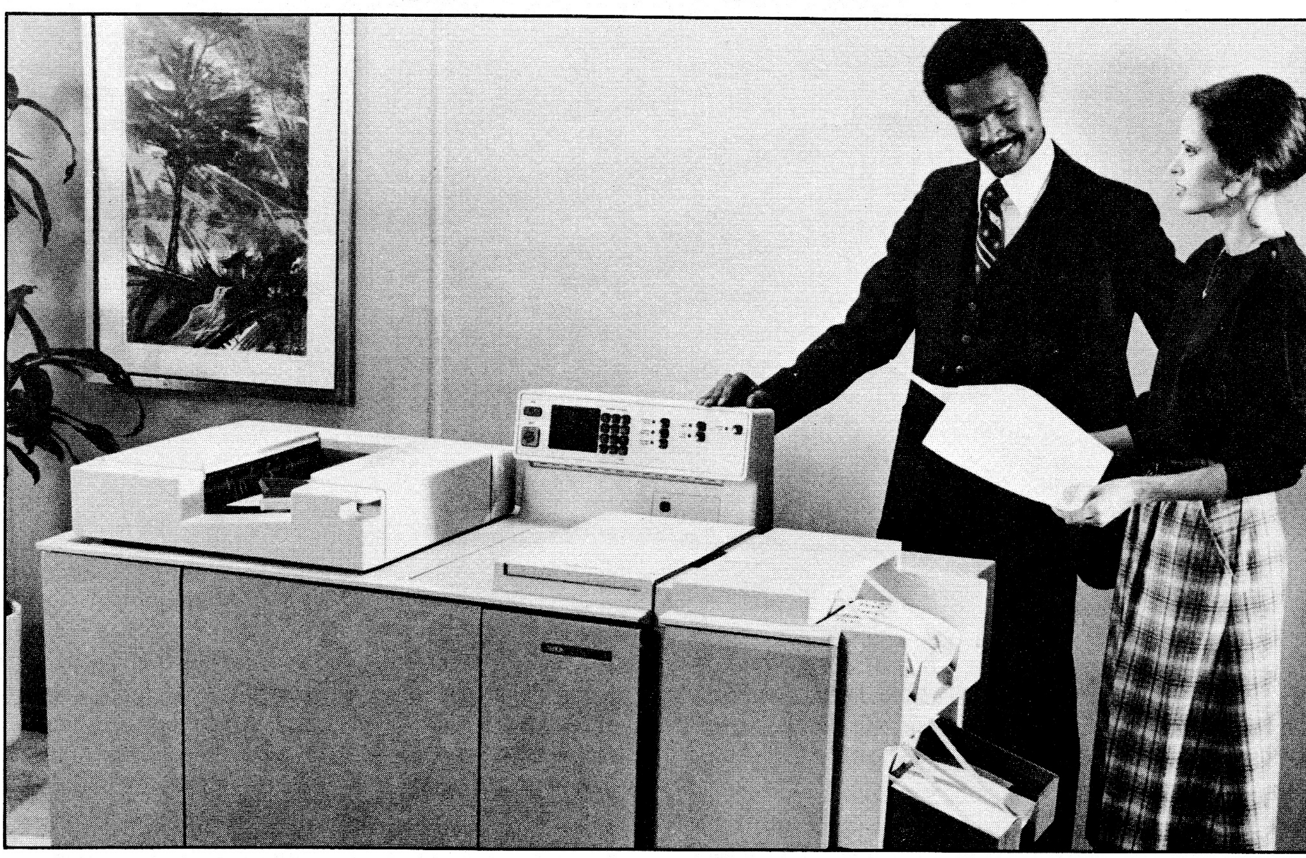
Duplexing

Duplexing allows the operator to copy both sides of a document simultaneously. (See Figure 8-12.)



Xerox.

Figure 8–12 Xerox 9500 copier with duplexing.



Xerox.

Figure 8–13 Xerox 5600 with automatic collating and finishing.

Image Retention

In a copier with the image retention feature, a receptor memorizes the image of the original document and can produce multiple copies of it. Thus, the original can be removed during multiple-copy reproduction.

Finishing

A number of attachments are available on today's copiers which complete the reproduction process by collating and stapling multipage reports or manuals. (See Figure 8-13.)

Color

Color copies add increased versatility to the copy process. Some color copies are capable of reproducing an image from a 35 mm slide onto an enlarged, full-color paper copy.

SUMMARY: ADVANTAGES AND DISADVANTAGES OF COPIERS

ADVANTAGES	DISADVANTAGES
1. There is no need to type a master or a stencil. 2. Equipment is generally simple to operate. 3. All copies, from the first to the last, are of equal quality.	1. High costs can result from misuse and overuse and from employees' personal use.

SUMMARY: ADVANTAGES AND DISADVANTAGES OF DIFFERENT COPYING PROCESSES

WET PROCESSES	ADVANTAGES	DISADVANTAGES
Diazo	1. Copies are inexpensive. 2. Equipment accommodates very large originals.	1. Does not copy from opaque or two-sided originals. 2. Does not copy colors which are transparent to ultraviolet light. 3. Requires a great deal of maintenance.
Diffusion Transfer	1. Makes sharp, high-contrast copies. 2. Copies all colors. 3. Machines are comparatively low in price.	1. Care must be exercised in handling and storing sensitized papers. 2. Copies emerge damp and must be dried. 3. Copies are expensive. 4. Waste factor is high.
Dye Transfer	1. Up to seven or eight copies can be made from one multiple-copy matrix. 2. Copies all colors. 3. The more copies made from one matrix, the lower the cost is for each copy.	1. Copies are brown in color. 2. Quality depends on the number of copies made from one matrix. 3. Number of copies depends upon the skill and speed of the operator, along with the age of supplies and the temperature of the room. 4. Single copies are expensive.
Stabilization	1. The negative can be stored indefinitely for making future copies.	1. Copy emerges damp and requires drying before use. 2. Necessity of going through a negative stage in order to get a positive copy.

DRY PROCESSES	ADVANTAGES	DISADVANTAGES
Thermal	1. Simple and fast to operate. 2. There are no liquid developers to mix or pour. 3. No chemicals are needed. 4. Can also be used to make transparencies.	1. The quality of reproduction is not as high as other methods. 2. Will not copy images that have no metallic content. 3. Copy paper may darken if exposed to heat. 4. Paper gets brittle with age and with excessive handling. 5. Only copies of single sheets can be made.
Dual Spectrum	1. Uses no chemicals. 2. Copy paper, although coated, is similar to bond. 3. Copies all colors and solid areas well. 4. Small, quiet, and inexpensive. 5. Makes excellent reproductions of photos and halftones. 6. Copies books and bound volumes.	1. Two steps are involved, and two special papers are required. 2. Because both light and heat are used, the machine requires readjustments while operating when making multiple copies. 3. Copies remain heat-sensitive after copying. 4. Not suitable for heavy-duty use.
Electrostatic: Transfer or Xerographic	1. Uses untreated paper; duplicating or bond paper may be used. 2. Machines are very easy to operate. 3. Copies can be printed on both sides.	1. Does not reproduce photos in solid areas well.
Direct	1. Makes good to excellent reproductions of photos, halftones, and solids. 2. Most machines operate at a reasonably fast speed. 3. Machines are very easy to operate.	1. Coated paper, which is more expensive and heavier than ordinary paper, must be used. 2. Surface of copy can be marred by metal object. 3. Paper has a relatively short shelf life. 4. Can be used to copy only one side.

REVIEW QUESTIONS

True/False

Directions: Write a "T" in the blank if the statement is true, and an "F" if the statement is false.

_______ 1. The worldwide copier industry revenue was over $14 billion in 1980 and is growing steadily.

_______ 2. The coated-paper electrostatic process is also known as the direct electrostatic process.

_______ 3. Cold-pressure fusing allows copying without the use of heat to fuse the toner or ink to the paper.

_______ 4. The dual-spectrum copy process requires two kinds of copy paper to produce a duplicate.

_______ 5. Copies produced by the thermal process can be used for permanent files.

_______ 6. Toners have little effect on the appearance of copies.

_______ 7. Stabilization is a widely used copying process today.

_______ 8. One-component toners have separate toners and bonding agents.

_______ 9. Fiber optics can help reduce the size and weight of copiers.

_______ 10. The use of microprocessors in copiers can provide the user with better copy quality and less downtime.

Multiple Choice

Directions: In the blanks, write the letter of the choice that best completes each statement.

_______ 1. Silver or photo transfer is also referred to as
   a. dye transfer
   b. stabilization
   c. diazo
   d. diffusion transfer

_______ 2. A process that is widely used in making blueprints is
   a. dye transfer
   b. stabilization
   c. diazo
   d. diffusion transfer

_______ 3. The most widely used toners today are
   a. three-component powders
   b. two-component powders
   c. one-component powders
   d. liquid toners

_______ 4. Features and attachments that can be found on today's copiers include:
   a. manual sheet bypass
   b. enlarging
   c. image retention
   d. all of the above

_______ 5. A copier feature that allows the operator to copy both sides of a document simultaneously is known as
   a. duplexing
   b. reducing
   c. finishing
   c. image retention

SUGGESTED ACTIVITIES

a. Investigate three current periodicals on the subject of copiers and prepare a written or oral report on the latest developments.

b. Obtain brochures from five different companies selling copiers, and compare their features and costs. Select the best one for a given situation.

c. Invite a copier vendor to demonstrate a copier to the class.

9

PRINTING

Objectives

After completing this chapter, you will be able to:

1. List and describe five methods of printing.
2. Describe the basic theory of offset plates.
3. Give a general description of how an offset press works.
4. Explain the types of paper plates or masters.
5. Explain the types of metal plates or masters.
6. Prepare a direct image offset master.

In 1453 Johann Gutenberg invented a mold for casting separate metal letters, or type. These raised letters could be combined or set to form words and lines. When enough lines had been set to fill a page, they were put in a press, inked, and printed or impressed on paper. After the required number of impressions had been made, the letters were separated and used again in new combinations for setting the next page. Gutenberg's modest invention marked the beginning of printing as we know it today.

METHODS OF PRINTING

The printing industry utilizes a number of different printing processes in order to produce books, magazines, reports, and advertisements as speedily and as economically as possible. The five major methods of printing are *letterpress, gravure, engraving, screen,* and *offset* (Figure 9-1). With the exception of offset printing, the office worker is not involved in operating the printing equipment. However, a basic understanding of all five processes is necessary to an understanding of the field.

Letterpress

Letterpress printing is a *relief* process, in which ink is transferred from a raised surface directly to the paper through pressure. The areas to be printed are

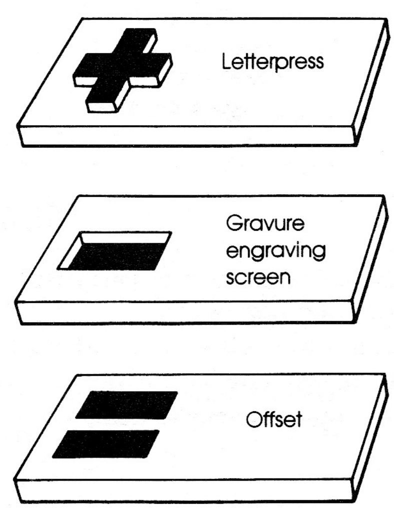


Figure 9-1 Basic methods of printing.

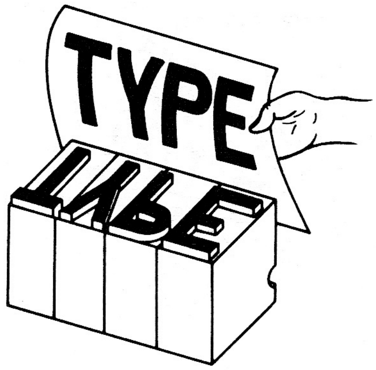


Figure 9-2

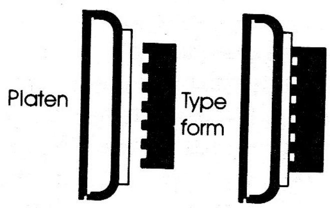


Figure 9-3

raised above the nonprinting areas. The ink rollers touch only the surface of the raised areas. The lower, nonprinting areas do not receive ink (Figure 9-2).

In letterpress printing, much time is consumed in adjusting the press form (the frame that holds the type) so that both the heavy and light areas will print with correct impression. Type and plates may be of different heights, and more pressure is required for the larger printing areas. The raised surface may be metal type, set by hand or by linotype, or metal or plastic plates.

Distinctive features of letterpress printing are a raised ring outlining letters and a slight embossing on the reverse side of the paper. Many customers regard these effects as a sign of "quality" printing. The three major types of letterpress machines are the *platen press,* the *flat-bed cylinder press,* and the *rotary press.*

Platen Press

On a platen press, paper is fed onto a flat surface called a *platen.* The entire type form is printed at one time when the type and the platen are pressed together (Figure 9-3). Forms can be either type or plates. While this type of press is not suitable for printing books or high-quality color work, it is ideal for *job printing* (such as circulars and stationery) at speeds up to 4,000 impressions an hour. The platen press is frequently called a job press.

Flat-Bed Cylinder Press

In a flat-bed cylinder press, paper is printed as it passes between a flat *bed,* which holds the form, and a rotating *impression cylinder,* which provides the pressure. Since only a narrow strip of paper is printed at one instant, less pressure is required than on a platen press. The form is locked in the flat bed, which moves back and forth under the fixed rotating cylinder. The paper, held securely to the cylinder by a set of steel clamps, or *grippers,* is rolled over the form as the bed passes under the cylinder. As the bed returns to its original position, the cylinder is raised, the type form is automatically re-inked, and the printed sheet is delivered (Figure 9-4).

Flat-bed cylinder presses are used for printing booklets, cartons, catalogs, labels, and similar materials. With modifications, cylinder presses are used by carton manufacturers for cutting, perforating, and scoring. This press is adaptable to most types of printing, from work on coarse paper to the finest halftone and color process reproduction on coated paper.

Rotary Press

Rotary presses are the fastest and most efficient letterpress machines and are ideal for long-run quality color work. The rotary press is normally used in large newspaper plants. It contains two cylinders which turn together. A curved printing plate is attached to the *plate cylinder,* and paper is fed around the *impression cylinder.* Each revolution of the impression cylinder produces a printed

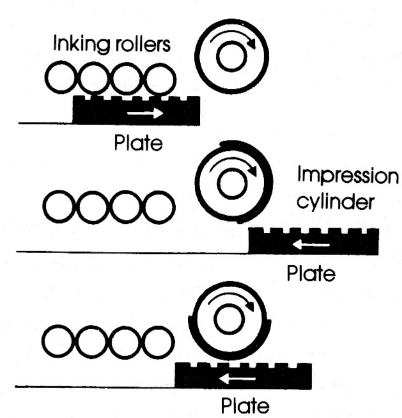


Figure 9-4

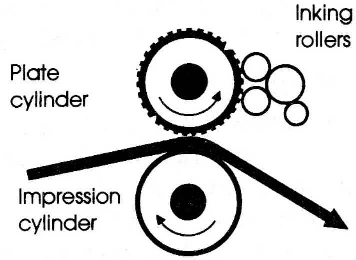


Figure 9–5

Figure 9–6

image, whereas the flat-bed method prints only with every other revolution (Figure 9-5). Continuous forms can also be sprocket punched, perforated, and printed in one operation. In recent years, time-consuming press preparation has been reduced with the development of new systems.

Letterpress printing provides greater body and color intensity than most other printing processes, since the ink is applied directly to the printing surface under pressure. The printer must have a perfectly smooth surface on which to print, or extensive time has to be spent in *make-ready,* the process of leveling off the type or plates for successful printing. Typewritten or hand-drawn material cannot easily be used, and the metal or plastic plates that must be used for illustrations are expensive.

Web-Fed Rotary Press

The web-fed press prints a continuous roll, or *web,* of paper on both sides as it passes through the press. One side is printed and dried first. The *blanket-to-blanket web offset press* prints both sides of the paper at the same time.

These presses are used for all types of printing, from newspapers to fine color work in magazines and catalogs. Speeds of over 1,500 feet per minute are possible.

Gravure

The gravure method of printing uses a sunken or depressed surface for transferring the ink to paper. A cylindrical copper plate is etched with depressions, or *cells,* of different depths to hold the ink, and direct contact is made between the inked plate and the paper. The excess ink is wiped off the surface by a *doctor blade.* The ink remaining in the thousands of recessed cells, or *wells* forms the image by direct transfer to the paper as it passes between the plate and impression cylinders (Figure 9-6).

Like rotary letterpress machines gravure presses are available for both sheets and rolls of paper. When the printing is done from a cylinder instead of a flat plate, the process is called *rotogravure.* The high press speeds and inexpensive paper that can be used with gravure printing result in cost savings. The primary disadvantage of this method of printing is the high cost of the plates. Therefore, it is practical only for long runs where the plate costs can be absorbed. Sunday newspaper color supplements, most large circulation magazines, and large mail-order catalogs are common examples of rotogravure printing.

Engraving

Plate engraving, like gravure, is an *intaglio* method of printing—that is, the printing area is recessed *below* the surface of the plate. The design or lettering to be reproduced on paper must be engraved, or cut into, the surface of a copper or a steel plate. This engraving may be done by hand, using a tool called a *graver,* or it may be outlined by a graver and then etched with acid. In both cases, the work is done in reverse (as though in a mirror). If very small lettering is needed, a pantograph engraving machine may be used to simultaneously trace large master letters and cut them in a reduced size into the plate.

The plate on the engraving press is inked and wiped clean. The engraved lines retain ink because they are below the surrounding surface. The plate is then forced against the printing paper with sufficient pressure to cause the ink to adhere to the paper (Figure 9-7). Engraving is now used only for currency, postage stamps, stock certificates, and expensive invitations.

ENGRAVING

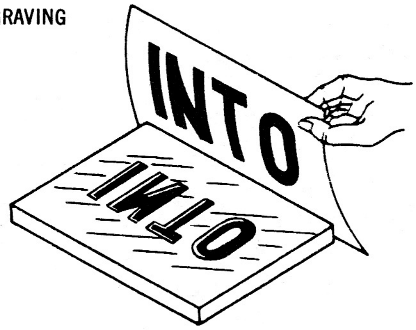


Figure 9-7

SCREEN PRINTING

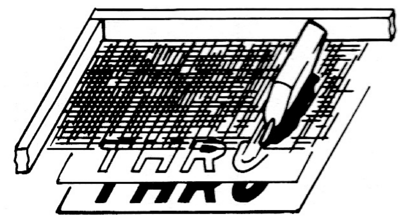


Figure 9-8

Screen

Silk screen printing is done *through* the plate rather than *from* the plate. A finely woven screen or cloth is stretched tightly and fastened to a frame. A stencil of the desired design is fastened to the bottom side of the frame. This stencil can be prepared photographically or by cutting out the desired image with a knife.

The sections forming the background (the nonprinting area) are blocked out by painting the silk with lacquer, shellac, or some other substance that will prevent the ink from going through the screen onto the paper. Paper (or other material to be printed on) is placed beneath the stencil frame, and the frame is lowered into a contact with it. A paintlike ink is poured into the frame. Then a rubber-blade squeegee is scraped across the stencil, forcing ink through the open areas of the stencil onto the object beneath it (Figure 9-8).

Silk screen printing is a rather slow process and is seldom used for long runs. It has the unique advantage of being usable on a variety of materials besides paper, such as vinyl, glass, cloth, and metal. It is also ideally suited for printing on objects of almost any size and shape—such as cartons, bottles, and machine parts. The colors used in this process resemble paint more than common printing inks. It is possible to lay down a film of ink up to 15 times as heavy as in any other printing process and to produce uniquely brilliant colors. Silk screen printing is also the only process that can print a pure white on a black surface.

Offset

Unlike the relief and intaglio methods, offset is a *planographic* method of printing; that is, one in which the image (or printing) area is level with the nonprinting area. The remainder of this chapter will deal with the offset process in detail, since this is the process office workers are most likely to use.

BASICS OF OFFSET PRINTING

The offset plate, or *master,* is a thin sheet of paper or metal treated chemically and mechanically so that its surface will retain a thin film of water. The text or artwork to be printed (the *image*) is transferred from the original to the plate by a photochemical process; in its final steps the image is developed through (in most cases) a lacquer process. The image may also be created directly on the plate by typing, hand lettering, or drawing, using special lithographic typewriter ribbons, pencils, crayons, or inks which create a greasy image on the plate.

A completely prepared offset plate contains two separate and distinct areas on its flat surface: (1) the image (printing) area, and (2) the clear (nonprinting) area (Figure 9-9).

If a water-saturated cloth pad is passed over the entire surface of a completed offset plate, a thin film of moisture will adhere to the clear areas of the plate. Water will not adhere to the developed image area. Instead, it will run off and pull away from the image. If a small roller, or brayer, covered with greasy lithographic ink is passed over the entire plate, a deposit of ink will be added to the image, and no ink will adhere to the water-dampened clear areas of the plate. Thus, it is evident that (1) the image area is receptive to ink but repels water, and (2) the dampened clear area of the plate is receptive to water but repels ink. However, if an ink-charged brayer is passed over an offset plate that has not been moistened, the ink will adhere to the entire surface of the plate—image and clear areas alike.

On commercial offset presses, the water and ink are fed automatically to the offset plate. The press

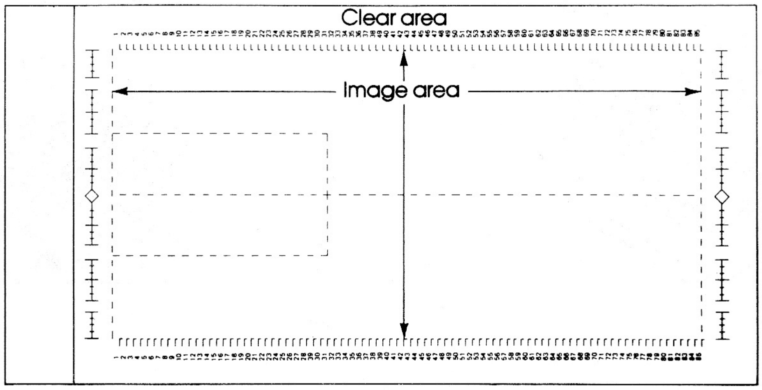


Figure 9-9 An offset plate has two areas, the clear area (on which printing or writing will not reproduce) and the image area (on which lettering or drawing can be reproduced).

operator controls the balance between the amounts of ink and water which are allowed to reach the plate. This balance ensures that only the image portions of the plate will print.

THE OFFSET PRESS

Figure 9-10 shows only the basic parts of an offset press. Actual offset presses are much more complicated.

Note that the offset press has three large cylinders:

1. The *plate cylinder,* on which the offset plate is mounted.
2. The *blanket cylinder,* which is covered with a hard rubber blanket.
3. The *impression cylinder,* which has a smooth metal surface. (Chrome cylinders are best because they repel ink better and, therefore, are easier to clean.)

There are two fountains, or *reservoirs:*

1. The *ink fountain,* which carries a supply of ink.
2. The *water fountain,* which contains the plate-dampening solution.

Two series of rollers, one from the ink fountain and one from the water fountain, furnish ink and water to the plate.

When the press is started up, the water roller is brought into contact with the plate, coating it with a film of moisture. The water adheres only to the clear area of the plate because the developed image repels it. Next, the ink roller contacts the plate. The ink adheres to the developed image, but it is repelled by the water-covered clear area. By a carefully controlled feeding of water and ink, the offset plate is successfully inked in only the desired image areas. If too much water is applied, the copy will print too light. The plate image will become weak and unable to accept ink from the ink rollers. If too much ink is applied and not enough water, the copy will print with a light gray background; letters such as "a," "o," and "e" may fill in.

When the rubber-covered blanket cylinder is brought into contact with the plate cylinder, the *right-reading*—that is, readable—inked image of the plate prints onto the blanket. The image printed on the blanket is a *wrong-reading,* or mirror, image of the plate. Finally, the paper is passed through the press between the blanket and impression cylinders and is printed upon by the blanket. The image is reversed again, and now appears in readable form on the paper (Figure 9-10). Note that the plate does not print directly on the paper. Instead, the plate prints on the blanket, and then the blanket image is transferred (or *offset*) to the paper—hence the term *offset* printing.

OFFSET PLATES OR MASTERS

An offset plate is a thin sheet of paper, plastic, or metal from whose surface the inked printing image is transferred to the offset blanket during the operation of the press. The term *master* is used interchangeably with the term *plate* to indicate an offset plate of metal or other material; in general, however, a master usually means a plate for one of the smaller sizes of offset presses.

SCHEMATIC DRAWING OF AN OFFSET PRESS

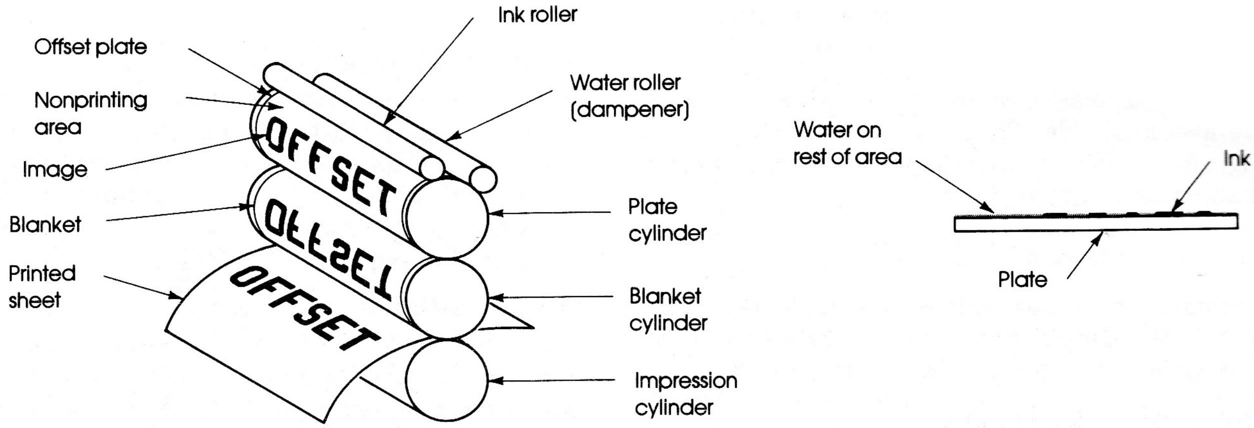


Figure 9–10

Masters or plates are available in a wide range of sizes and weights, with slotted, straight-edge, or pinbar punchings for mounting, and in roll form, in individual sheets, or in fan-fold packs. To achieve a high-quality, economical run, care should be taken to ensure that the plate selected is the proper one for a specific purpose.

Paper Plates or Masters

An offset master or plate is a specially prepared sheet of paper, coated to make its surface receptive to both grease-based images and water, yet resistant to the penetration of moisture. In addition, the paper master must be capable of resisting unwanted handling marks, such as fingerprints. Paper masters for an office-size offset printer are designed to produce between 50 and over 1,000 copies on a single run. There are five methods for imaging the offset paper masters.

Direct Image

The direct-image paper offset master, as the name implies, is imaged directly by ball-point pen, pencil, crayon, rubber stamp, carbon paper, or typewriter ribbon. Each of these specially developed imaging media contains an oil-based substance which will be ink-receptive on the offset printing machine. Six types of typewriter ribbons are designed especially for the offset printing process: carbon ribbons (either paper, polyethylene, or mylar) and fabric ribbons (either cotton, nylon, or silk). These ribbons may be left in the typewriter at all times, and perform very well for regular typing purposes. In addition, special drawing tools, are available for use with the offset master, as well as special correction tools and methods of filing.

Electrostatic Transfer Method

With the *electrostatic transfer method,* a typical office photocopier is used to place the image on the master. The original copy is projected onto a photo-conductive plate which has a positive charge. The latent image on the plate passes through a shower of pigmented particles of toner which adhere only to the image. In turn, this image of toner particles is transferred to a paper master through an opposite electrostatic charge. These particles are then fused onto the master through the application of heat, and the master is ready for use on the offset printer.

Electrostatic Direct Method

In the *electrostatic direct method,* the electrostatic charge is placed on the master surface. The surface is exposed and the charge is deposited only in the image area, "leaking off" the nonimage area. Next, toner is applied to the charged image. Finally, the master is fused by heat (except in the case of machines that use liquid toner).

Transfer Method

In the *gelatin transfer* and *phototransfer methods,* a light-sensitive sheet of film receives the image through a camera from an original copy and images a master for use on the printer. In the Kodak Ektalith method, gelatin is transferred to the master. In the *diffusion transfer* method, chemicals cause a reaction on the master to make the image area receptive to ink. Enlargements and reductions are possible. Other methods of diffusion transfer

and gelatin transfer imaging use a copying machine (e.g., Xerox) to prepare the master. These units will give only same-size reproductions.

Presensitized Method

Paper- and plastic-coated presensitized masters are also available. Their lack of durability limits their use to short runs or to pure line work (rather than halftone illustrations).

Metal Plates or Masters

Compared to paper and plastic masters, metal plates offer longer runs, higher quality printing, and increased handling and filing durability.

Presensitized Method

For long runs and high-quality printed copies, the *film negative* and the *presensitized-plate* method of producing offset plates is the most widely used. A film negative is made from the original copy through a graphic camera which allows enlargement and reduction. Film negatives can be filed and used to make plates again and again, whenever new printings are needed or as images on the plates wear out.

The quality of copies is excellent. Fine detail on the original copy can be captured accurately on film. This method can be used to create halftone negatives, and can reproduce both photographs and linework faithfully.

Plate exposure units offer a fast, easy, low-cost method of exposing presensitized plates. The film negative and plate are positioned and held in a vacuum frame during exposure. A timer-controlled, high-intensity light source uniformly distributes light over the entire negative surface, burning through the negative into the plate. The plate is developed and washed to prepare it for printing.

Transfer Method

In the diffusion transfer method (described under "Paper Plates or Masters" on p. 75), either a camera or a photocopy machine can be used to image metal offset plates. Photocopy machines are used for same-size reproduction. Cameras will allow enlargement and reduction of copy.

Other Methods

Two other methods of plate preparation, *wipe-on* and *deep etch,* are used by professional printers for superior quality work. The longer processing and the greater knowledge required for their preparation make these methods less convenient for smaller offset machines.

Offset Copy Preparation: Techniques and Tips

Copy can be prepared for offset printing as described in Chapters 2 through 7. Another technique for preparing offset masters involves drawing, typing, or writing directly on the master. Preparation techniques for direct image masters are described in the following section.

Artwork

Copy for offset reproduction falls into three general categories: *line, halftone,* or *full color. Line* copy is black and white, with no variation in shade. Examples are typewriter copy, ink drawings, and solid shapes (Figure 9-11).

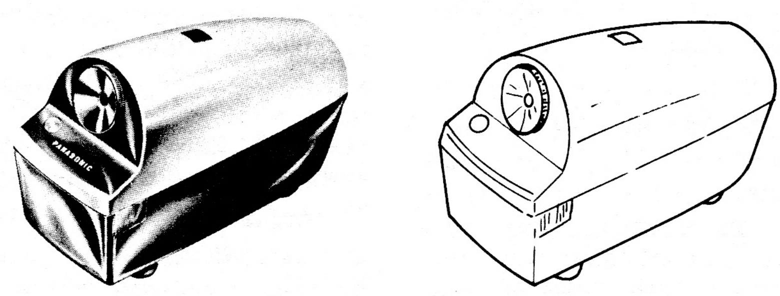


Figure 9-11 Finished artwork is copy ready for the graphic camera. Most of the art to be used is in black and white for best copy reproduction. Two types of copies in finished artwork are line copy (which is usually made of solid lines with no variations in shade; for example, a copy from the typewriter, a pen or ink drawing, or a solid area) and halftone copy (which is copy that is composed of shades or tones of gray or black; for example, photographs and shaded sections).

A *halftone* is art containing graded tones of shading from light to dark. The most common form of halftone is the photograph. In offset printing, tones are not reproduced by varying the amount of ink in the image. The press can print only solid color in the image area, and no color (or inking) in the nonimage areas. In order to reproduce photographs in varying tones, halftone screens are used in which a pattern of very small and clearly defined dots of varying sizes are printed (see Figure 9-12). The halftone is in fact an optical illusion in which tones are actually a large number of small dots of different sizes printed in uniform thickness.

Halftone screens give an effect of contrast and variety. They can be extremely coarse or very fine. Commonly used screens have 65 or 150 lines per inch. The finer the screen, the closer the dots are to each other. Screen tones can also provide tonal values of 5 percent through 90 percent. For most printing, a screen of lesser percent is used to reduce color density (Figure 9-13).

Figure 9–12

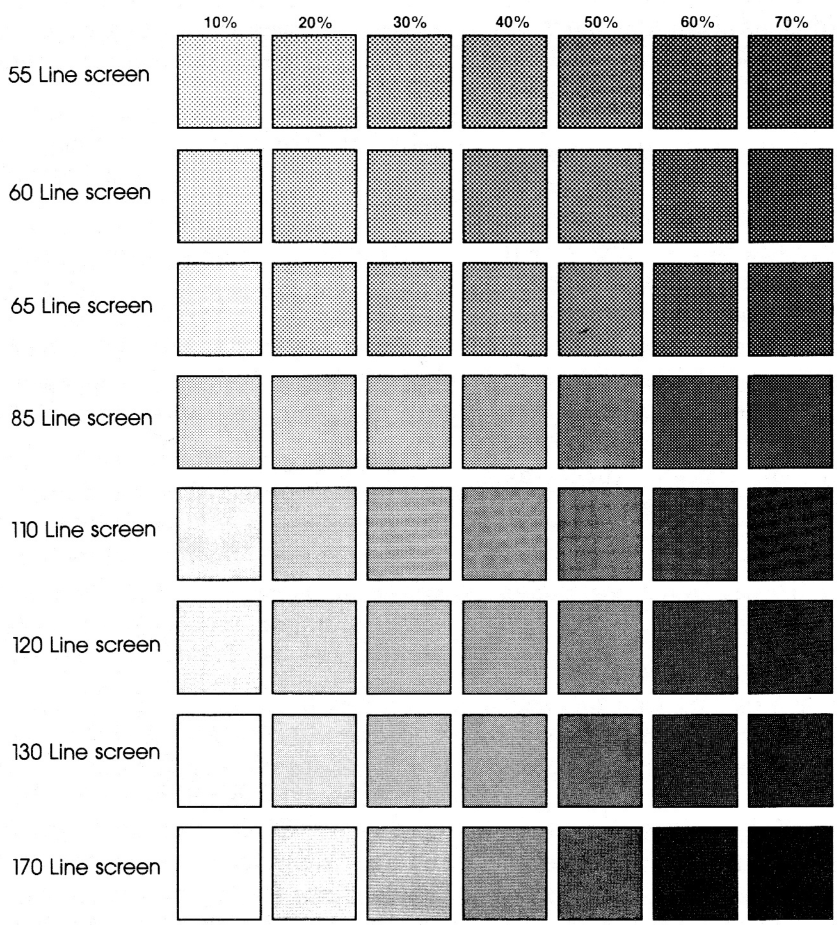


Figure 9–13

Full color printing requires four separate press runs. Only one color of ink can be printed with each pass. Therefore, four plates are required, one for each of the four basic colors. The three colors of yellow, magenta, and cyan (blue), plus black, produce what appears to be all the colors of the visible spectrum. The process of making the negatives for the plates is called *color separation.*

Most halftones or photographs are *cropped* for use in printing. This means that the area that is to be printed is marked off on a tissue overlay and the unwanted area is deleted when the photograph is reshot through the screen.

Although dark blue and red will reproduce fairly well, the reproduction of black copy is so superior that special effort should be made to prepare line copy in black. Black india ink should be used for artwork. Pale colors such as light blue, gray, or yellow should not be used. White paper is best for the original because some colors photograph as shades of gray, making it difficult for the camera operator to separate the drawing from the background.

Since the line negative, which is made photographically, is capable of extremely high fidelity, all lines and edges should be as clean and sharp as possible. Any fuzziness in the artwork will be equally fuzzy in the negative, plate, and finished product.

It is convenient and customary for the artist to draw original lines one third or one half larger than the final reproduction size. The reduction of the original art by the camera to its reproduction size normally tends to minimize slight imperfections and crudeness in the art. Conversely, enlargements will tend to accent imperfections. However, reduction may cause delicate lines to crowd so close together that the photographic film used to make the line negative will not separate them. The lines will fill in, thereby appearing denser and less sharp in detail than desired.

Typing

A master can be inserted directly into a typewriter or the printer of a text editor.

Preparing the Typewriter. A practice or test master can be made by typing one line for each position of the multiple-copy control and impression selector. A test run of the master will determine the best copy control and impression selector combination. This combination can be written on a label inside the typewriter for future reference.

Darker copies can be obtained when the impression selector is set so that ink is deposited only on the surface of the master. The master should not be indented by the pressure of the typing.

The printing element or typebars must be cleaned frequently—particularly if a fabric-ribbon typewriter is being used.

The paper bail rollers should be placed in the margins to prevent the ribbon ink from smearing during the typing.

Making Corrections. Only erasers designed especially for offset masters should be used. They are softer and contain no abrasives that might scratch the surface and cause smudging when reproduced.

Use a light, lifting stroke. Clean the eraser after each stroke with a clean sheet of bond paper. Only the surface ink needs to be removed. A "ghost" image (such as the letter "d" in Figure 9-14) will not reproduce. White correction fluid can be used for large-area corrections.

erasd

Figure 9-14

A correction should be made only once in a particular space. After a first erasing, the eraser will begin to destroy the surface coating, and a smudge will appear when the master is reproduced.

Reinserting Masters. Smudges from the feed rolls can be prevented by placing a sheet of copy paper over the typing as the master is rolled into the typewriter.

Getting Darker Copies. When using a fabric ribbon, the typist can get darker copies if the master is allowed to set for at least 30 minutes, and preferably 2 to 3 hours, before being run. The surface of the master is like a sponge, and restores the ink to the surface after a period of time.

Handling Masters. Your hands should be completely clean before handling a master. Even a hand lotion containing lanolin causes finger marks. The masters should be handled only at the edges, to avoid smearing the typed characters or getting finger marks in the margins. Masters should not be folded, for creases will produce smudges on the final copies.

Reproducing Handwriting. Pens, pencils, or markers specifically designed for reproduction on offset masters should be used. This eliminates the guesswork in choosing the right medium. A pale blue nonreproducing pencil should be used to mark guidepoints for typing tables, captions for photographs, and the like. Writing should be done on a hard surface, using normal handwriting pressure.

SUMMARY: ADVANTAGES AND DISADVANTAGES OF THE PRINTING PROCESS

ADVANTAGES	DISADVANTAGES	APPROXIMATE COST
1. The quality of printing compares favorably with the original.	1. Equipment is generally much more expensive than that of other processes.	Equipment: $2,500 and up
2. Each copy (from the first to the last) is the same good quality.	2. Trained operators are required.	Salaries: varies
3. Printing can be done in color and on both sides of the paper.	3. Material costs and care and maintenance of the equipment are much greater than for other processes.	Supplies: varies
4. As many as 10,000 copies an hour can be produced, depending on the type of equipment.		

REVIEW QUESTIONS

Matching

Directions: In each blank write the letter of the term that matches its description.

_______ 1. printing process in which ink is transferred from a raised surface directly to the paper through pressure.

_______ 2. also known as a job press; not suitable for printing books or high-quality color work.

_______ 3. the fastest, most efficient letterpress machine; ideal for long-run quality color work.

_______ 4. a printing process that prints a continuous roll of paper on both sides as it passes through the press.

_______ 5. a printing process that uses small cells of ink to transfer the image to paper.

_______ 6. a printing process in which the design or lettering is cut into the surface of copper or a steel plate; work is done in reverse.

_______ 7. printing that is done through the plate rather than from the plate; can print white ink on a black surface.

_______ 8. a planographic method of printing, in which the image is level with the nonprinting area.

_______ 9. any process that prints from below the plate surface.

_______ 10. another name for an offset plate.

a. engraving
b. gravure
c. intaglio
d. letterpress
e. master
f. offset
g. platen press
h. rotary press
i. silk screen
j. web-fed rotary press

Multiple Choice

Directions: In the blanks, write the letter of the choice that best completes each statement.

_______ 1. The most widely used method of offset plating for long runs and high-quality printed copies is the
- a. presensitized method using metal plates.
- b. presensitized method using paper masters.
- c. transfer method using metal plates.
- d. transfer method using paper masters.

_______ 2. An offset process whereby a paper master is imaged directly by ball-point pen, pencil, crayon, rubber stamp, carbon paper, or typewriter ribbons is known as the
- a. electrostatic transfer method.
- b. electrostatic direct method.
- c. direct image method.
- d. presensitized method.

_______ 3. A method that utilizes the gelatin and phototransfer process is the
- a. transfer method.
- b. electrostatic direct method.
- c. direct-image method.
- d. presensitized method.

_______ 4. Which of the following statements on printing is false?
- a. Equipment is generally much more expensive than that of other processes.
- b. Trained operators are required.
- c. Printing cannot be done in color.
- d. Material costs, care, and maintenance of the equipment are much greater than that of other processes.

_______ 5. In offset printing
- a. the greasy-inked image is receptive to ink but repels water.
- b. the greasy-inked image is receptive to ink but absorbs water.
- c. the dampened clear area of the plate is receptive to water but absorbs ink.
- d. the dampened clear area of the plate is not receptive to water.

SUGGESTED ACTIVITIES

a. Visit a printing shop and observe the different types of equipment in operation; report to the class.

b. Invite the manager or supervisor of a printing shop to speak on current trends in printing.

c. If equipment and supplies are available, choose a selection from the Appendix in the Production Work section, and make a direct-image master and run 25 copies. Evaluate the quality of the printed product.

10
THE CARBON PROCESS

Objectives

After completing this chapter, you will be able to:

1. Demonstrate the two methods of inserting carbon packs into the typewriter.
2. Demonstrate the removal of a carbon pack from the typewriter.
3. Demonstrate the correction of errors on the original and the copies, both before and after the pack is removed.
4. Describe carbon copy notations and explain their uses.
5. Discuss special techniques and tips regarding color, discarding, and storage.
6. Identify several problems of using carbon paper and their solutions.
7. List the advantages and disadvantages of the carbon process.

The carbon process should be matched to the needs of the user. These needs are the reasons carbon papers come in different qualities and weight—both of which are related to the consistency of the coating. Carbon paper is made by coating tissue paper with ink, wax, oil, and lampblack. If any color other than the standard black is desired, dyes are added to the mixture. A newer type of carbon is made out of mylar; this type of carbon is stronger, lasts longer, and eliminates many of the problems found with carbon paper.

Selection factors relating to originals, carbon paper, and copies were given in Chapter 2. Once a user has made these choices, certain procedures may be followed in order to receive top quality and full value from the carbon paper process.

PROCEDURES

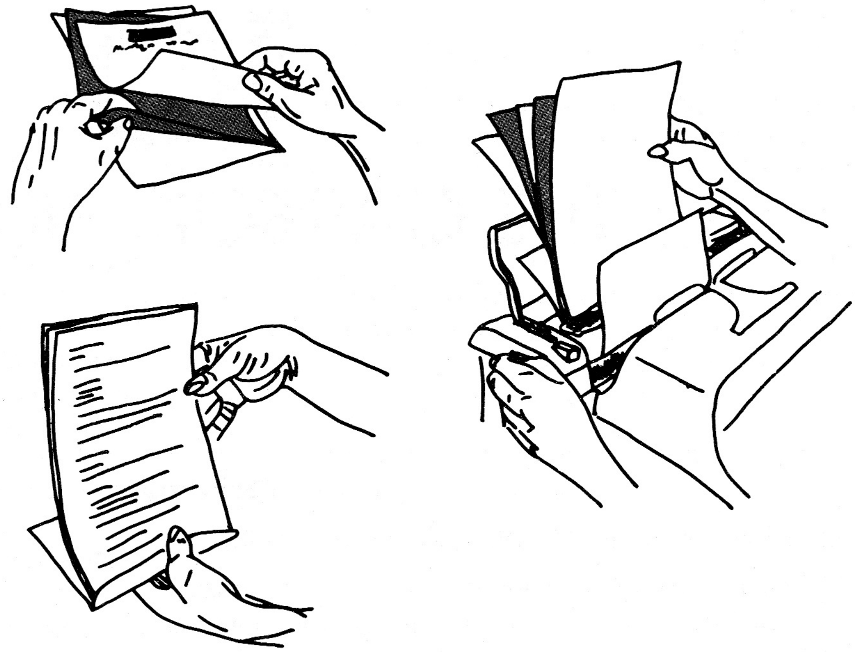
The first step is to determine the number of copies needed. The carbon pack (which includes the original, carbons, and copy sheets) contains one more sheet of typing paper than of carbon paper. Two methods—*desk assembly* and *machine assembly*—can be used in inserting the carbon pack.

Desk Assembly

Place a copy sheet on which the carbon copy is to be made flat on the desk; then place a carbon sheet (carbon side down) on top of it. Add one more copy sheet and carbon for each carbon copy desired. Then place the original sheet (letterhead or bond) right side up on top of the stack.

Pick up the carbon pack and turn it so the copy sheets and carbon sides of the carbon paper are facing forward. Straighten the pack by tapping the tops of the sheets gently on the desk. For a medium- or large-size pack, adjust the typewriter's multiple-copy control to increase the space around the platen.

Insert the pack into the typewriter by holding it firmly in one hand while turning the cylinder slowly with the other. Avoid wrinkling (sometimes called treeing) by releasing and resetting the paper-release lever after the pack has been par-



DESK ASSEMBLY can be done more easily by placing the carbon pack in the fold of an envelope or in the fold of a small piece of paper before inserting the pack in the typewriter. This procedure helps in keeping the papers straight and in starting large carbon packs. After the pack is inserted, remove the envelope or paper.

or

Insert a piece of paper about halfway around the platen. Then insert the carbon pack between this piece of paper and the platen. After insertion, roll the platen forward and remove the sheet of paper.

Figure 10-1

tially inserted. The pack can be straightened while the paper-release lever is forward (Figure 10-1).

Machine Assembly

Select the bond or letterhead to be used for the original, and place underneath it copy sheets equal to the number of copies desired.

Insert this stack of paper in the typewriter by turning the cylinder until the sheets are gripped slightly by the feed rolls. Then lay all but the last sheet over the top of the machine.

Place carbon paper between the sheets of paper with the carbon side upward. Flip each sheet back as each carbon is added (Figure 10-2). Roll the pack into typing position. There should be no need to straighten the pack when using this method of assembly.

Removal

To take the carbon pack out of the typewriter, grasp the pack in the left hand, pull the paper bail and the paper-release lever forward with the right hand, and then pull the pack from the typewriter with the left hand.

The most efficient way to remove the carbon paper sheets is all in one motion—not one sheet at a time. To do this, use the thumb and first finger of the left hand to grasp the upper left corner of the carbon pack (if not using carbon paper with cut corners, cut off the upper left corners diagonally before inserting carbon pack), and gently but firmly shake the pack downward. This should cause the carbon sheets to fall out on the desk. If the machine assembly method for assembling the carbon pack was used, or if the carbon paper is slightly longer or wider than the typing paper, the carbon extensions can be grasped and pulled out with the right hand in one quick motion.

To assemble carbon copies and originals for stapling or for insertion into a notebook, first lay out the original and copies of the last page of the typed material, face up on the desk. Then add the next-to-last original and copies. Continue placing each page in order, face up, on its pile. This way, the pages are collated in correct order, and page numbers can be verified at the same time.

MACHINE ASSEMBLY

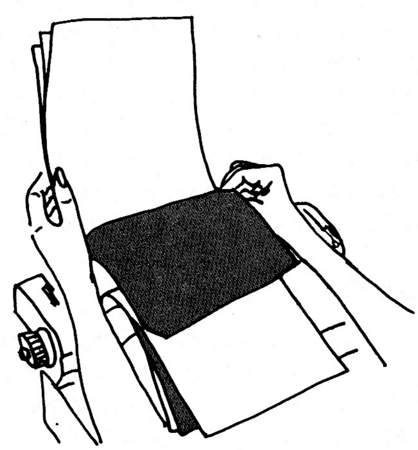


Figure 10-2

Erasing

Typing errors should be erased and corrected on the original and on all copies. Two kinds of erasers are needed. Use a hard (typing) eraser for correcting errors on the original copy. A soft (pencil) eraser works best on carbon copies. Gum-type cleaner is used before an eraser to absorb the ink. Try various brands, kinds, and shapes of erasers until you find those that work most effectively on your particular jobs.

Error Discovered Before Pack Is Removed from Typewriter

Move the carriage (or element) to the extreme right or left, depending on the side of the page on which the erasing is to be done, so that the eraser dust will fall on the table and not into the machine. Roll the paper forward so that it rests on the flat paper rest on the back of the typewriter. If an erasure is necessary near the bottom of the page, roll the paper back and erase from the bottom end (Figure 10-3).

Place a small card (3 by 5 inches) or a metal shield directly behind the original (Figures 10-4 and 10-5). The card or shield should be in front of the carbon—not behind it. Otherwise, the carbon will be erased off the carbon paper, soiling the card or shield and using up the carbon in that particular area.

Move the card or metal shield behind the first carbon copy, and use the soft eraser on that copy. Continue erasing all carbon copies in this manner, moving from front to back.

Use a light stroke for typing corrections so that the erased word blends into the rest of the copy. On an electric machine with a pressure dial, the typist can reduce the pressure dial to zero before typing corrections.

Erasing Hints

- Find out which way the grain of the paper runs (see Chapter 2). Erase with the grain, usually with vertical strokes.
- Erase each letter separately instead of scrubbing the entire error; use light, short strokes.
- Be sure your hands are clean. Never place your fingers on the typed material.
- Keep the eraser clean by rubbing it on an emery board, sandpaper, or a rough surface.
- Smooth the erased surface with a round hard object such as the blunt end of a ball-point pen before typing the correction.

Error Discovered After Pack Is Removed from Typewriter

If errors are found after the carbon pack has been removed from the typewriter, replace each copy in the machine separately. A carbon correction

ERASING NEAR THE BOTTOM OF THE PAGE

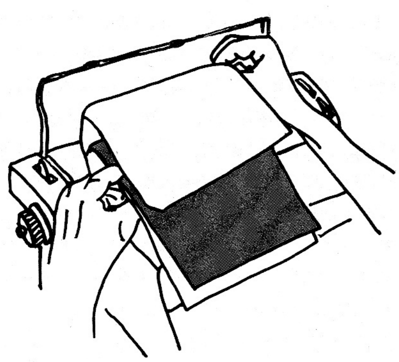


Figure 10–3

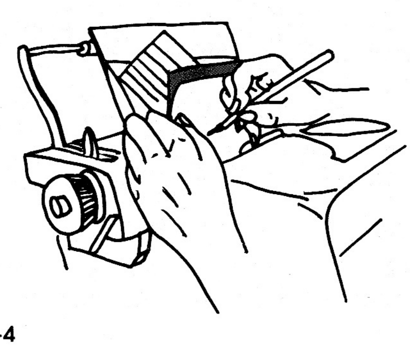


Figure 10–4

ERASING AIDS. Metal shield and a 3 × 5 card.

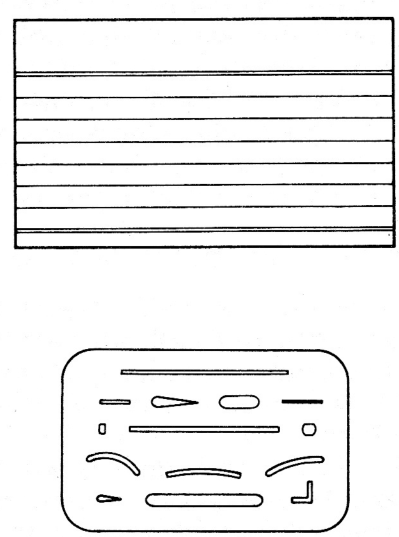


Figure 10–5

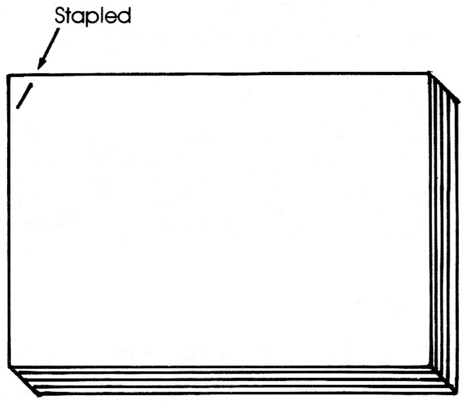


Figure 10-6

(rather than a ribbon correction) may be made by placing a small piece of carbon paper over the spot where the correction should be typed. In the case of a large carbon pack, the correction may appear too dark on some of the copies. This can be overcome by stapling together several slips of paper and pieces of carbon paper, making a small packet (Figure 10-6). Then the same shade of correction can be obtained by using the appropriate depth of the small packet.

Reinserting Paper

Using the aligning scale in front of the cylinder, vertically align the base of the word to be corrected with the top edge of the aligning scale. The variable line spacer can be used for this operation.

Using the paper release, move the paper to the left or right until a straight letter (such as i, t, l, or a period) aligns with one of the white marks on the aligning scale.

Alignment can be checked by placing a piece of cellophane (such as a window envelope) over the line, striking the letter you have aligned, and checking the light impression left by the typebar.

Alternate Methods of Correction

Originals may also be corrected by means of *correction fluid* or *cover-up correction tape.* Both of these products are available in white and a variety of colors to match paper colors, such as blue, green, pink, or yellow.

Correction fluids provide an easy way to cover up errors, and if skillfully done, the correction can be almost undetectable. Cover-up correction tape (also available in sheets) is coated with a chalklike substance which is transferred to the paper when the incorrectly typed letter or letters are retyped.

These alternate correction methods may be used on the carbon copies, but some typists find it quicker and easier to use the alternative method on the original while using the eraser on the carbon copies.

Some typewriters have a built-in lift-off or correction tape device but this is useful only on the original copy.

Another less common method of correction is *rub-on* or *transfer letters,* which can be purchased by the sheet in a size and typeface that match the typewriter typeface and size. This method is particularly useful when an error is discovered after the page has been removed from the typewriter. The correction is made without having to reinsert the page back into the typewriter. First remove the error with an eraser, fluid, or tape. Then apply the rub-on letters over the erased letter(s). This procedure is valid for the copies as well as the original.

Carbon Copy Notations

Sometimes a letter is addressed to several individuals, with all copies typed at once, using carbon paper. The names are all listed in the address lines or in the salutation. On such cases, original bond, letterhead paper, or a heavier grade of onionskin may be preferred to ordinary copy paper.

Business letters and other documents are usually typed with at least one carbon copy for office files. Many are typed with several carbons so that several persons can receive individual copies. When carbon copies of a letter to a single addressee are to be sent to others, a reference notation (cc or bcc) is typed below the other reference symbols. Such copies are handled like multiple-addressee letters, except that the sender does not sign each one. A rubber stamp may be used, or the secretary can type in the executive's name preceded by (Signed), S/, /S/, or Sgd. Special carbon copies such as legal papers must be typed on the same paper as the original and must be signed.

The typist puts a colored check mark on each copy after the name of the cc or bcc addressee who will receive that copy. In this way, anyone who may pick up a copy of a letter or document will know exactly to whom that copy belongs. This also indicates to the receiver that he or she was intended to receive the carbon, and it can take the place of a covering letter. The bottom, or last, copy is the one that should be kept for the files.

cc Notation

When a writer wishes his or her correspondent to know to whom copies have been distributed, a cc

c Mr. Farley**	CC L. Amis
cc Mrs. Smith	B. Jones
cc: Mr. John Smith, K & K Company	P. Smith
cc: L. Amis	J. Williams
B. Jones	CC: JIS
P. Smith	CC: K & K Enterprises, Los Angeles
J. Williams	

* In case of a blind carbon copy, use bcc or BCC instead of cc or CC.

** A single c stands for a copy produced on a copier or duplicator.

Figure 10–7

(carbon copy) notation is typed under the other reference symbols. Ordinarily the surname is enough identification for the carbon-copy notation. Sometimes the address is given if it assists the typist in sending the carbon copy or if it is necessary for filing information. If several persons receive carbon copies, the names should be listed according to rank, or, if there is no difference in rank, alphabetically. Acceptable styles of cc and bcc are shown in Figure 10-7.*

bcc Notation

When a writer does not wish the correspondent to know of the distribution of some or all of the copies, a bcc (blind carbon copy) notation is typed in the same place as the cc notation or at the top left corner of the letter. The bcc is not typed on the original. There are two methods of typing this indication so that it will not appear on the original letter or document.

After finishing the letter and removing the carbon pack, the typist can peel off the original copy and any carbon copies on which the bcc is not to appear, and then reinsert the remainder of the carbon pack. In the blank space at the top (the space filled by the letterhead on the original copy), the bcc is typed against the left margin.

The other method does not involve removing the carbon pack from the typewriter. The blind carbon copy notation is made in the same place as a regular carbon copy notation, but a small piece of paper or card is placed between the typewriter ribbon and the original so that the typing is done on the small paper or card rather than on the original. Printing will still appear on the carbon copies. The multiple copy control or impression indicator lever should be adjusted to ensure that the original notation does not leave an impression that can be read.

SPECIAL TECHNIQUES AND TIPS

Color

There may be times when you wish to insert a figure or a word in red (or another color). To do this, insert small pieces of colored carbon paper behind the typewriter ribbon and behind each sheet of carbon paper. Thus, words, symbols, or phrases can be typed in color without changing either the typewriter ribbon or the carbon paper.

Discarding

Carbon paper should be discarded as soon as it becomes wrinkled or treed. A letter will not print correctly on the copy if a typed letter is struck over a wrinkle. However, if a portion of the sheet is still usable, it could be cut and saved for use in making corrections.

The primary prerequisite for carbon paper is that it produce a clear and easily read copy. The appearance of the carbon paper itself, except in the case of wrinkling or treeing, cannot determine when it should be discarded. Even if a carbon sheet

*In case of a blind carbon copy, use bcc or BCC instead of cc or CC.

looks very worn, it can produce clear copies and should not be discarded. However, do not hesitate to discard a piece of carbon paper that cannot meet the criterion of clear and easily read copies. In typing that involves a great many figures, carbon sheets must be discarded sooner, because numbers must be especially legible.

Storage

Carbon paper should be stored in its original folder in a flat position. Curling will occur if carbon paper is not stored flat. Store carbon paper away from any heat source with the carbon side down, because heat or sunlight can harm it.

Do not allow carbon paper to pile up in an untidy stack next to the typewriter or in the desk drawer. Such a stack is not only messy, but usually results in ruined carbon paper.

Correction of Problems

Here are a few solutions to carbon paper problems you may encounter.

Curling of Carbon

Store carbon paper with the carbon side down in the box away from heat, cold, or moisture. For longer use, rotate the sheets both top to bottom and front to back to distribute the wear more evenly.

Cutting Through Carbon

Use a heavier weight of carbon paper, especially for the first carbons. If using a lightweight bond paper, place an additional sheet of bond behind the first.

Poor Legibility of Copies

Use a harder-finish carbon paper to get a sharper copy. Keep the element or typebars clean. If the platen is worn or needs replacement, try a different typewriter. A hard backing sheet of plastic or stiff paper can keep the platen from developing ridges or grooves. On typewriters with worn platens, the backing sheet eliminates unevenness of type. Check the copy paper and the carbon to be sure that the best finish and weight is being used for the number of copies being made. Check the typeface and size. A large, fine-line typeface will carry impressions through a greater thickness of paper and produce more copies.

Light Impression on Copies

Use a harder-finish carbon paper and a lighter-weight copy paper. If an electric typewriter is being used, check the multiple-copy control and the impression indicator to be sure they are properly set.

Offsetting on Copies

Offsetting refers to carbon marks or smudges appearing on the copies. This offsetting may be controlled by using lighter-weight copy and carbon paper or by adjusting the multiple-copy control for the thickness of the carbon pack. Avoid snapping the paper-release lever back into position, for this often causes smudging.

Short Life of Carbons

Alternate the carbons from the top to the bottom and from the front to the back of the pack so that the carbon sheets will wear more evenly. The harder the finish and the higher the quality of the carbon paper, the longer its life.

Slippage of Carbon Pack

When inserting a heavy carbon pack, an envelope or piece of paper can be used (see Figure 10-1). To prevent the carbon pack from slipping when typing near the bottom of the page, insert a sheet of bond paper between the cylinder and the last carbon copy. This extra sheet will remain across the feed rolls as you type close to the bottom edge and will hold the carbon pack firmly in place.

Smudging on Copies

Switch to a copy paper with less gloss, so that more of the carbon may be absorbed into the paper rather than sitting on top of the paper. A harder-finish carbon paper tends to smudge less.

Treeing Carbons

After inserting the carbon pack, pull the paper release forward and then back into position. This action smooths out wrinkles that are just beginning. Also, use the paper-release lever whenever you lift the carbon pack from the typewriter.

SUMMARY: ADVANTAGES AND DISADVANTAGES OF THE CARBON PROCESS

ADVANTAGES	DISADVANTAGES
1. Copies are relatively inexpensive.	1. The material must be typed or keyboarded in order to obtain copies.
2. Copies are made at the desk — the typist does not have to go to another location for copies.	2. Both carbon and copy paper, in addition to the paper for the original, must be kept on hand in the desk.
3. Copies can be made on a text editor; all corrections can be completed before printing the document.	3. Unless using a text editor, a production slowdown occurs when typing carbons because of fear of an error occurring and the actual erasing task. The error must be corrected on the original and all copies individually.
4. Different colors of paper can be used with ease for coding purposes.	4. The number of copies is limited unless the copy is retyped.
5. No machine breakdown can occur (other than the typewriter itself) in the equipment, causing the normal work routine to come to a halt.	
6. The use of onionskin eliminates bulk in the files.	

REVIEW QUESTIONS

True/False

Directions: Write a "T" in the blank if the statement is true and an "F" if the statement is false.

______ 1. The two basic methods of arranging carbon packs are desk assembly and machine assembly.

______ 2. The most efficient method for removing carbon from the carbon packs is one sheet at a time.

______ 3. When erasing an error on a carbon, the card or shield should be placed in front of the carbon paper.

______ 4. If errors are found after the carbon pack has been removed from the typewriter, the typist should plan on retyping the entire document.

______ 5. If an erasure is necessary near the bottom of the page, the typist should take the document out of the typewriter, make the erasure, and reinsert the paper to make the correction.

______ 6. If several people are receiving carbon copies, the names should be listed according to rank, or if there is no difference in rank, alphabetically.

______ 7. Colored carbon allows the typist to type in color without changing the typewriter ribbon.

______ 8. If a piece of carbon paper appears worn, undoubtedly it will not produce clear copies and therefore should be discarded.

______ 9 Sunlight and heat can harm carbon paper.

______ 10. The condition of the platen has no effect on the quality of carbon copies.

Multiple Choice

Directions: In the blanks, write the letter of the choice that best completes each statement.

_______ 1. A newer type of carbon which is stronger, lasts longer, and eliminates many problems of carbon paper is
a. onionskin
b. vellum
c. diazo
d. mylar

_______ 2. When initially assemblying a carbon pack, the typist should make sure that the carbon sides of the carbon paper are
a. facing forward
b. facing back
c. alternates; one faces forward, one faces back, etc.
d. doesn't matter

_______ 3. "Treeing" can be eliminating by
a. releasing and resetting the paper-release lever after the pack is partially inserted.
b. leaving the paper release in the forward position while typing
c. shifting the machine to "stencil" position
d. resetting the impression setting

_______ 4. When a writer does not wish the correspondent to know of the distribution of copies, the following notation is used
a. bcc
b. bcn
c. cc
c. ccn

_______ 5. Carbon paper should be stored
a. carbon side up in the box
b. carbon side down in the box
c. loose in your desk drawer
d. any of the above.

SUGGESTED ACTIVITIES

a. Choose a selection from Appendix, "Production Work," page 162 and make two carbon copies. Correct all errors.

b. Discuss the following questions:
1. The efficiency of making carbon copies versus using a copier
2. The efficiency of correcting all errors on carbon copies

11
THE FLUID PROCESS

Objectives

After completing this chapter, you will be able to:

1. Describe the sizes, colors, and types of mastersets available on the market.
2. Describe the procedure for typing, correcting, and drawing on a masterset.
3. Explain the process for running the master.
4. Describe the procedure for making thermal masters.
5. Tell how a transparency can be used to run off fluid copies.
6. Give five tips for preparing the running masters.
7. List some advantages and disadvantages of the fluid process.

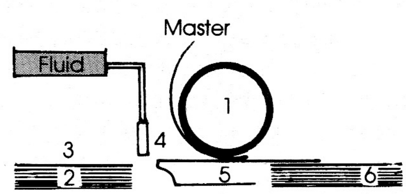
Fluid duplicating may be the oldest type of office machine duplicating. Other popular terms for this type of duplicating are *direct, liquid, ditto,* and *spirit* (because an alcohol-like fluid is used as a solvent for the aniline dye used in printing).

The ancient Egyptians, who experimented with beeswax as a transfer medium, are frequently credited with inventing the spirit process. Their first duplicators were merely flat pans filled with a mixture of gelatin, glycerin, and glue. From these crude beginnings, the process evolved through the centuries to the development of rotary machines, which are still used in industry today. These machines have relatively high rates of copy production.

The fluid process is an outgrowth of the gelatin process. Early experiments with the fluid process used water to moisten master sheets, so that a thin layer of ink or carbon could be transferred from the master to a copy. Only two or three copies could be made in this manner.

Little progress was made until 1920, when a machine that used a volatile fluid appeared. The spirit fluid, mainly a combination of wood and grain alcohols, moistened the copy paper rather than the master; thus, the fluid is the transfer medium. After this breakthrough, improvements in the process came at a rapid rate and the fluid process found quick acceptance in schools, churches, and commercial businesses.

Figure 11-1 is a schematic drawing of the fluid duplicating process. Master paper, on which there is a reverse image, revolves on the drum of the duplicator, transferring hectograph carbon to copy paper coated with a light film of spirit fluid. In effect, the spirit fluid dissolves a small amount of the carbon image from the master paper and transfers it to the copy paper where it dries in a moment.



1 Drum
2 Paper
3 Paper Feeder
4 Wick
5 Roller
6 Copies

Figure 11-1

THE MASTERSET

The masterset consists of an original sheet of white paper (the *master*) attached to a sheet of duplicator carbon (not regular typing carbon) which is coated with a waxlike dye or dye-forming substance. Writing, typing, drawing, or printing on the master transfers the dye material to the back of the master paper.

The masterset comes with a protective sheet between the carbon sheet and the white sheet; this must be removed before the master is used (Figure 11-2). The protective sheet keeps the master sheet free of carbon deposit from fingerprints, rough handling, and aging. After the master has been prepared, the protective sheet should be replaced behind the master sheet.

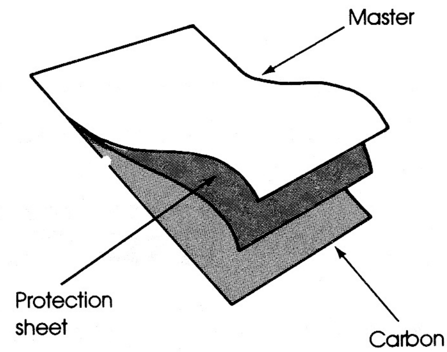


Figure 11-2

Sizes

Mastersets can be purchased in the following sizes: 8½ by 11 inches, 11 by 8½ inches, 8½ by 14 inches, 17 by 14 inches. (The first number refers to the width of the masterset in inches, and the second number is the length.) Carbon can be purchased in various grades, with prices varying accordingly. It can also be purchased without the attached white sheets; these individual carbons are more economical for multiple-color work.

Colors

Since the color of the copy depends upon the color of the dye in the master, switching to a different color of carbon during the drawing or typing process results in a multicolored master and a multicolored copy. Purple is the standard color and produces the largest number of copies; however, carbon is also available in red, green, blue, and black. Color can be used very effectively by drawing or typing on the basic purple carbon, then spotlighting headings, words, numbers, or other items by simply inserting a colored sheet of carbon behind the master.

In addition, colored paper can be used to attract attention or to brighten any duplication work. The most common paper colors are yellow, blue, pink, and green, but many other colors are available. Combinations of colored papers and colored carbons can produce a great variety of effects.

Short and Long Runs

Different mastersets have different amounts of carbon. The better or more abundant the carbon, the longer its life span, or potential for making copies. The longevity of a carbon is usually designated by "runs," or the number of copies it will produce. Short runs are those of not more than 100 copies—usually 50 copies or fewer. Medium runs are between 100 and 200 copies. Long runs are those of 200 to 300 copies. Liquid duplicator masters usually will not exceed 300 copies, even under the most favorable conditions, and most operators plan not to exceed 200 good copies as a general rule.

PREPARING THE MASTER

Preparing the master involves both typing procedures and, in some cases, drawing on the master.

Typing

The typed characters in the duplicate copies can be no better than the typewriter that prepared them. The first step is to have spotlessly clean type. The typewriter ribbon may be left in its normal position.

Experiment with different pressure settings to determine which is best for your particular typewriter. The striking impact transfers the carbon from the carbon sheet to the back of the master sheet. Any variation in the strength of this impact produces a variation in the density of the characters in the image. An imperfect platen (particularly that of a portable or manual typewriter) produces uneven masters. An uneven, worn, pitted, or soft platen reacts much like a water-soaked sponge, spreading out the image and resulting in broad and unclear print.

A stiff paper or plastic backing sheet between the platen and masterset improves the performance of the typewriter and the appearance of all duplicated copies. A backing sheet ensures that the

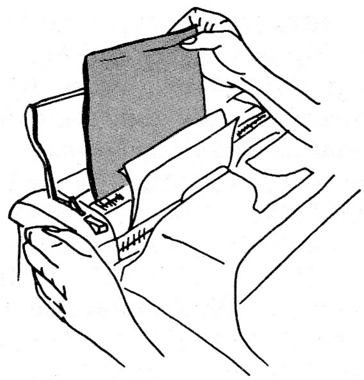


Figure 11-3

type will strike flush and that the platen will not yield on impact.

Typing with too heavy a pressure also creates an unclear master. The typewriter should be set at the lowest pressure possible that will result in an even amount of carbon throughout the master image. The exception to this rule is the IBM Selectric typewriter, which should be set at the highest pressure setting.

Select margins that will center material attractively on the page. Many adjustments can be made on the duplicator to compensate for copy being placed too high, too low, or too far to one side.

After the protective sheet has been removed from the masterset, the open end should be inserted into the typewriter. (This procedure makes error correction easier.) The master sheet is positioned and typed as though you were typing on a normal sheet of paper (Figure 11-3).

Since a poor touch is readily noticeable, electric typewriters work best for preparing masters. If you are using a manual typewriter, take care to type with a firm and even stroke.

The full sheet may be used, if necessary, except for the space needed at the top or bottom to clamp the master onto the duplicator drum.

Producing a master on a text editor is extremely easy, since work can be proofed and all errors corrected before the master is printed.

Correcting

During the duplicating phase, after the master has been typed, horizontal centering errors can be corrected by moving the copy to the left or right on the drum. Vertical placement errors can be corrected by inserting the opposite end on the drum, or by cutting off some of the master. Many machines have a knob or lever which will automatically raise or lower the copy.

Typing and drawing errors can be corrected so that they will never be detected in the copies. If a letter, word, line, or other error is to be deleted entirely, the correction can be made by covering up, scraping off, or cutting out the undesired material. The copy (on the back of the master) can be covered up with transparent tape, correction tape, or correction fluid on the carbon side of the master. A razor blade or knife can be used to scrape off incorrect or unwanted carbon images. Since the entire master is not needed in the running process, errors or marks on the master can be cut out completely. A regular lead pencil or a special white pencil can be used on the back of the master to mark out splotches.

Typing errors, which must be corrected by retyping the letter or word in the same place, require special procedures. The ribbon image should not be erased from the face of the master, or the corrected area will become thin and unable to pick up enough carbon to make an unnoticed correction on the duplicated copies. First pull the master forward in the typewriter and open the masterset. Then remove the error from the back side of the master with a razor blade, knife, or eraser (Figure 11-4). When using an eraser, a soft, pushing action will "roll up" the image so that it can be blown away. Although the master will not be absolutely clean, a faint mark will not reproduce. White pencils can be used after the scraping or erasing process to completely cover errors. Errors can also be covered up with correction tape or with a special correction fluid.

Since the carbon can be used just one time, the next step is to get a new piece of carbon (from an unused corner or a new carbon sheet) and place it on top of the old carbon sheet behind the error. Then type the correction, using a normal touch, and *immediately remove* the extra piece of carbon. The correction on the front of the master will appear as a strikeover, but the corrected copy on the back of the master will appear in print when the copies are run.

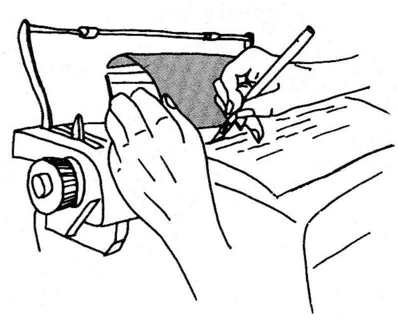


Figure 11-4

Drawing

When drawing on a master, remove the protective sheet from the masterset and write or draw on the front side with a ball-point pen, a pencil with a very hard lead, or a stylus (Figure 11-5). A hard, firm pressure should be used. A smooth, hard surface such as an illuminated drawing board is best when writing or drawing on masters. The light on an illuminated drawing board should be *turned off* because the heat may melt the carbon. Drawn errors are corrected in the same way as typed errors.

When two lines intersect on a drawing on the master, only the last line drawn shows as a complete line. An easy technique for making a picture is to sketch the illustration lightly on the master without the carbon under it. When the illustration appears as desired, the carbon is reinserted under the master sheet and traced over the sketch with a pen, pencil, or stylus.

In order to create the appearance of halftone work, a screening plate may be used. A screen consists of a piece of plastic etched with a pattern. It is placed beneath the masterset, and a stylus is rubbed over the master wherever the screening design is to appear. Several different patterns are available in plastic screening plates.

Commercially prepared insets—such as those available in workbooks for teachers in the elementary grades—or self-prepared insets can be taped into position on the masters.

RUNNING THE MASTER

The master is placed on the cylinder of the spirit duplicator with the dye side up. As the copy paper enters the machine, it is moistened with a fluid similar to alcohol. As the moistened paper continues through the duplicator, it is squeezed against the master. Some of the dye dissolves and is transferred to the copy paper, creating the duplicate image. By the time the copies are in the receiving tray, the fluid has evaporated. If the fluid does not evaporate and the copies are wet, there is either too much fluid being supplied or the quality of fluid is poor. (Spirit fluid is used rather than plain water because of its rapid evaporation.)

The procedure for running a master on either a hand-operated or electric machine is as follows: (The parts of a fluid duplicating machine are shown in Figure 11-6.)

1. *Get the duplicator ready.* Be sure there is fluid in the fluid tank. Place paper on the feed tray. Adjust the rubber grippers and the paper guides for the width of the paper. Check to be sure that the tray that catches the copies is in position.

2. *Set the pressure lever or knob.* If a large quantity of copies is wanted, start with the pressure lever or knob at a low or light pressure setting. For example, if 300 copies are required, take the number of pressure settings on the machine and divide into 300. For example, 300 ÷ 6 = 50. In this case, you would run 50 copies at each setting. This method will allow the master to wear down gradually. This practice will make all copies approximately the same; otherwise, the first ones would be dark and the last ones extremely light. If just a few copies are needed, a medium setting may be used during the entire run.

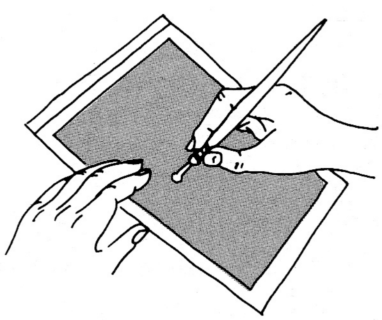


Figure 11-5

1 Tank
2 Drum
3 Clamp lever
4 Copy control lever
5 Paper tray
6 Handle at 6 o'clock position
7 Feed tray
8 Paper guide
9 Paper grippers

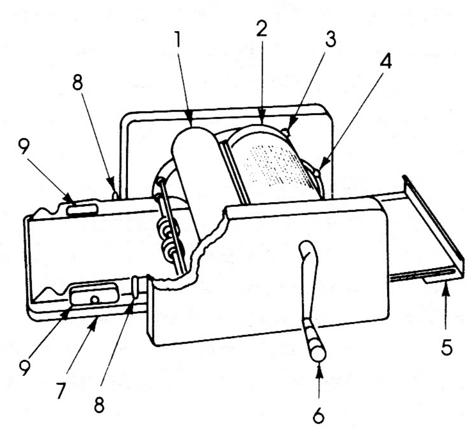


Figure 11-6

If you are using a machine that has been idle for more than an hour, wait until the wick is properly moistened. If it is very wet, darker copies will be produced, but fewer of them. If the wick is too dry, light copies will be made. Before putting the master on the drum, run paper through the machine to test for wetness. Use as little fluid as possible for good copies.

3. *Put the master on the machine.* A handle or lever opens the clamp that holds the master on the drum. The carbon should face up, or away from the drum. Be careful not to touch the carbon side of the master.

4. *Run the copies.* Lower the feed rollers to grip the paper. If a manual machine is being used, the handle is usually turned in a clockwise direction. If the machine is electric, simply turn on the motor and activate the feed mechanism. Each time the drum resolves, one copy will be made. Most machines have a counter that may be set to zero before starting the run. As each copy is produced, the counter will increase by one.

5. *Remove the master.* Open the clamp lever, lift out the master (be careful not to touch the carbon side of the master), and then close the clamp lever. If the master is to be used again, clip it to the protective sheet. The carbon should be folded in half, carbon side in, and discarded. If the machine is not to be used anymore, turn everything off and clean up the work area. The machine should be left with the pressure control knob or lever in the off or zero position, and the master clamp should be closed.

THERMAL MASTERS

Masters can be made on photocopy machines by either the thermal or dual-spectrum methods. These procedures not only eliminate the need of retyping originals, but also permit the direct reproduction of magazine and newspaper articles.

A masterset that includes a specially coated tissue sheet, as well as a film sheet with carbon to be transferred to the master, is used (Figure 11-7). The masterset is placed in a transparent carrier, then fed through a thermal or a dual-spectrum photocopier. The masterset is removed from the carrier and the carbon sheet is peeled from the master. (If the master is peeled from the carbon, the resulting copies may be weak and spotty.) Extra spots and blotches sometimes appear on the back of the master; these can be touched up in the same way as on a regular fluid-process master. Copies are then made from the master on the fluid duplicator in the normal way.

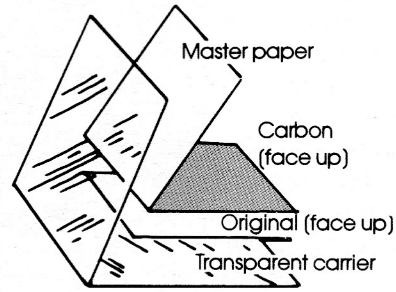


Figure 11–7

Used or old masters can be rejuvenated by the use of the photocopiers that make thermal masters. A regular spirit carbon is placed against the old master and exposed or run at high speed through the photocopier (using either the thermal or dual-spectrum method). A few more copies can then be run from the master.

Another solution is to use the old master to make a new thermal master. If the old master is not available—but just the fluid-duplicated copies or other nonfaxable (nonreproducible) copies are—a faxable photocopy can be made on an electrostatic copier, and then used as the original in making the thermal copy.

Transparencies for overhead projection are generally used as audio-visual aids, and some copiers can make overhead transparencies. One type of transparency is made on a thermal photocopier with the use of a fluid carbon. Then the transparency can be used as a fluid master to make copies before it is used as a projected image. This enables a speaker to both project a visual transparency and supply his or her listeners with identical copies of it.

SPECIAL TIPS FOR FLUID DUPLICATING

There are special tips on preparing masters and operating the machine.

Preparation of Masters

1. Break up solid typed pages by using letter guides, primary type, colored carbon, or (if using a Selectric typewriter) different elements for major headings. Indent important paragraphs, or set them off by themselves and draw boxes around them. Handwriting also draws attention to important materials.

2. A ruler and a fine ball-point pen or a loop stylus can be used for underlining. This method is

faster and gives a cleaner, better-looking line than the underscore key on the typewriter.

3. Vary the paper sizes by using legal length, letter size, or any odd size that is desired. If copies on narrow paper are to be run, type in the upper left-hand portion of the master. For running cards, use the upper center location on the master.

4. If an original (on plain paper) and a master are needed, both can be made by typing with the plain paper on top and the masterset directly beneath. If more copies are needed than can be reproduced from one master, make two masters at once by inserting the two mastersets into the typewriter at the same time. Increase the pressure on the typewriter before typing. Of course, both copies must be corrected in case of error.

Machine Operation

1. When running copies, the machine sometimes wrinkles the master before producing the required number of copies. This problem can be corrected by putting transparent tape on the front of the master. Two people are needed for this operation; the first pulls the paper firmly on each side of the wrinkle, while the second applies the tape.

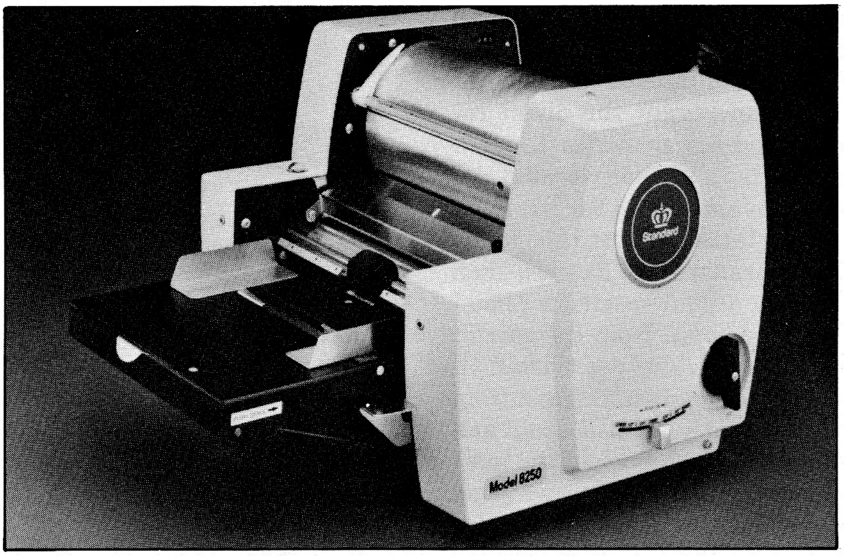
2. Keep the impression roller clean at all times to prevent unwanted "offsetting" of the image onto the back of the copy paper. The drum should also be kept clean. The duplicating fluid itself is the best and most convenient cleaning agent.

3. Revolve the drum a couple of times *without* the master attached, to ensure that the first copies will be uniformly coated with fluid. During these revolutions, operate the paper-feed device and adjust it to prevent skipping. If the drum rotates with the master attached, but no paper goes through the machine, dye from the master will be offset onto the bottom roller. This roller must then be cleaned, or it will transfer the dye to the backs of future copies.

4. Wrinkled masters can be avoided if you take care in placing them on the drum. Always check for a wadded piece of paper or foreign matter that may damage a master after it is on the drum.

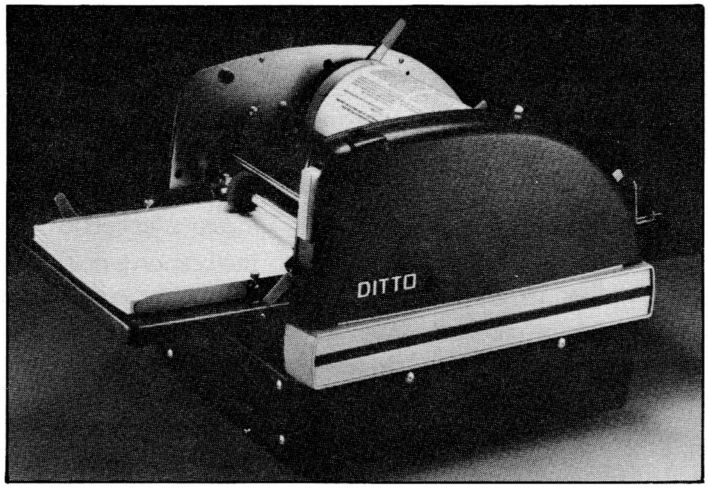
5. Putting the master on straight is a simple matter, but it is essential if you want good copies every time.

6. Sometimes operators discover that the protective tissue was mistakenly left in place during the typing of a master. If this happens, all is not lost. In most instances, the protective tissue can be used as the master and a limited number of copies can still be run.



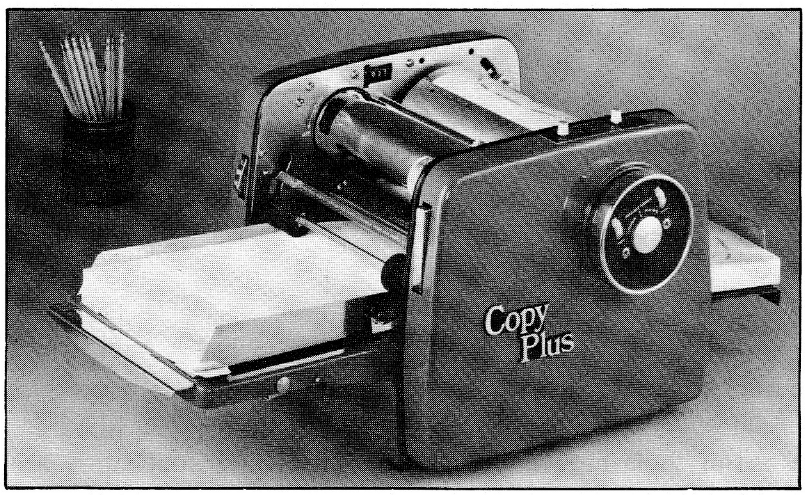
Standard.

Standard Model 8250 spirit duplicator.



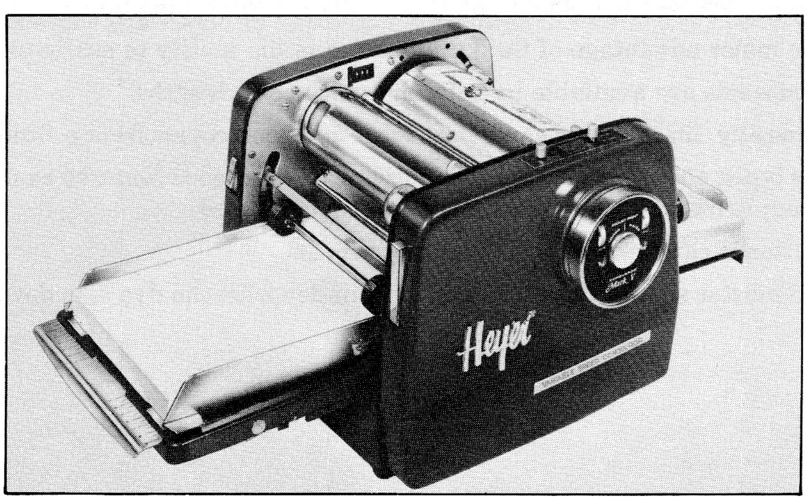
Ditto.

Ditto D31 spirit duplicator.



Copy Plus.

Copy Plus spirit duplicator.



Heyer.

Heyer Mark V spirit duplicator.

SUMMARY: ADVANTAGES AND DISADVANTAGES OF THE FLUID PROCESS

ADVANTAGES	DISADVANTAGES
1. Copies cost less than a half cent apiece. Operator and mechanical costs are low.	1. A master must be prepared in order to make copies of an original. Thus, typographical errors can occur.
2. Operators can be trained in a few minutes. Anyone from a school child to an executive can operate a duplicator.	2. The number of copies that can be produced from one master is limited to a few hundred.
3. Copies are as legible as typewritten information.	3. The carbon is quite messy unless handled carefully (although the colors black and blue tend to be cleaner than other colors).
4. Repetitive use of masters is possible on a broad range of copy-paper weights.	4. Purple, the color used most often, does not have the professional look of work produced by more sophisticated equipment.
5. Five colors can be produced easily on a single copy.	5. Fluid-duplicated copies make poor originals for most photocopy machines.
6. After preparation of the master, over one hundred copies per minute can be made.	6. Black masters tend to reproduce in gray rather than black.
7. A text editor can be used to produce error-free copy, eliminating the need for corrections on the master.	

REVIEW QUESTIONS

True / False

Directions: Write a "T" in the blank if the statement is true, and an "F" if the statement is false.

_______ 1. The fluid or spirit process was an outgrowth of the gelatin process, which was invented by the Egyptians.

_______ 2. Because of their high duplicating quality, fluid duplicators are commonplace in most businesses today.

_______ 3. A masterset consists of a piece of white paper (master) attached to a sheet of typing carbon.

_______ 4. The protective sheet should be left in place when typing on the masterset.

_______ 5. One major advantage of fluid duplication is the ability to easily use a variety of colors.

_______ 6. Mastersets are available in different widths and lengths.

_______ 7. Generally, an operator can get at least 500 good copies from a fluid master.

_______ 8. The typist should make sure the material to be typed is centered exactly on the master, since no adjustments can be made once the page is typed.

_______ 9. Halftones can be used with the fluid process.

_______ 10. The master should be placed on the cylinder with the dye side down.

Multiple Choice

Directions: In the blanks, write the letter of the choice that best completes each statement.

_______ 1. Which of the following should *not* be used to make corrections on a fluid master?
- a. typing eraser
- b. transparent tape
- c. liquid paper
- d. a razor blade

_______ 2. The protective sheet is used to protect the master from
- a. aging
- b. fingerprints
- c. rough handling
- d. all of the above

_______ 3. The standard carbon color of a fluid master is
- a. black
- b. purple
- c. blue
- d. green

_______ 4. The fluid duplicating process generally is used for
- a. low-quality, high-quantity runs (over 500 copies)
- b. low-quality, low-quantity runs
- c. high-quality, high-quantity runs
- d. high-quality, low-quantity runs

_______ 5. Which of the following is the least desirable tool for producing a master?
- a. manual typewriter
- b. electric typewriter
- c. text editor
- d. ball-point pen

SUGGESTED ACTIVITIES

a. Choose a selection from Appendix, "Production Work," page 162 and make a master. Use a purple carbon and one other colored carbon. Type, draw, and write on the master. Make corrections as needed.

b. Run 25 copies of the master you made in Activity A. Compare the first copies you produced with the last ones, and decide whether you used the duplicator correctly.

12
THE STENCIL PROCESS

Objectives

After completing this chapter, you will be able to:

1. List the special types of stencils.
2. Describe the parts of a stencil pack.
3. Describe the steps in preparing a stencil.
4. Explain how to run a stencil.
5. Describe some problems of poor stencil quality and tell how to solve them.
6. Describe the process of using a thermal stencil.
7. Describe two ways of making color on a stencil.
8. List some advantages and disadvantages of the stencil process.

Unlike the more limited fluid processes, stencil duplicators can reproduce almost any kind of copy. Even photographs and other halftone material can now be duplicated, thanks to the development of electronic stencil-cutting devices. The quality of the copy is better than spirit-reproduced copy, though not quite as good as offset printed copy. Stencil-produced copy is deeper and more even in tone than spirit copy. The stencil process is also called the *mimeograph* or the *ink* process.

Stencil duplicating began in the 1870s when a young lumberman, A. B. Dick of Chicago, wanted a quicker and easier way than handwriting to reproduce price lists for his many customers. His experiments resulted in the first mimeograph.

The first stencil process widely accepted by American business was developed by Thomas Edison. In order to write on the stencil, Edison developed an electric vibrator needle which perforated the stencil. Through these perforations, the copy paper drew ink by capillary attraction, making copies from the stencil. (Incidentally, the vibrator needle invented by Edison contained the first electric motor ever manufactured and sold commercially.) Over 60,000 of these needles were sold, which is an indication of the importance of duplicating to business, even 80 years ago.

THE STENCIL

The modern stencil process employs a very fine porous sheet of tissue, which is coated with a wax-like substance that does not absorb ink. The stencil is prepared by removing this coating, either by typing or with a stylus, to permit ink to pass through.

After the stencil has been prepared, it is attached to the cylinder or screen of the stencil duplicator or mimeograph machine. As the cylinder or screen revolves, impression paper is brought into contact with the stencil between the cylinder and the impression roller. Ink is pressed through the waxless tissue areas of the stencil sheet to produce the image.

Today, each manufacturer produces a wide variety of stencil sheets for different purposes. *Long-run* stencils are the most durable and produce the

highest copy quality. A *plastic film* sheet lets the typist prepare full legal-size stencils without cleaning the keys. *Artist* stencils are suitable for detailed lettering, tracing, and drawing as well as for typing. *Average-run* stencils are not as durable as these other types, but can be used for many jobs.

Selection of the stencil for any given job should depend on how many copies are to be produced and whether the copy is to be typed or drawn. If most of the reproduction work calls for fewer than 1,000 copies, the average-run stencil should be adequate. However, a long-run stencil should be used if the stencil is to be rerun at a later date. If most of the work is to include drawings, the artist stencil would be the most suitable.

Special Types of Stencils

There are various special types of stencils. Each is described in the following section.

Addressing

Use of the addressing stencil eliminates tedious writing and rewriting of frequently used addresses. One name and address is typed in each of the 33 spaces provided; the stencil is run off on gummed labels.

Outline Map

Various outline maps, such as of countries or states, are available as stencils for use in filling in geographic locations or territorial information.

Document

Document stencils are designed for mimeographing legal and other oversized documents. Lines and numbers are already on the stencil.

Newspaper

Special stencils are designed for mimeographing newspapers, newsletters, lists, and other columnar work. Two-column and three-column guidelines are printed on the stencil to provide a professional-looking layout and to eliminate time-consuming measuring.

Four-Page Folder

On four-page folder stencils, guidelines eliminate measuring and copy-positioning errors. These stencils are available in both letter- and legal-size format.

Music

Music stencils come with precut staffs.

Handwriting

Stencils are available with guidelines spaced one-half inch apart to give ample room for handwriting.

Bulletin

A bulletin stencil is "top-printed" to guide the typist in preparing bulletins or similar double-page forms that would otherwise require a long-carriage typewriter. The stencil is cut in the area where the crease of the bulletin will occur, and each "page" is typed separately. The stencil is then pasted together with cement or correction fluid.

Electronic

With the use of an electronic scanner, electronically prepared, ready-to-run plastic stencils allow the printing of fine linework, headlines, various typefaces, office forms, letterheads, direct-mail bulletin or memo headings, and catalog pages, including pictures and solid areas.

Thermo

The thermo stencil is prepared by running it, with the printed or type original, through a Thermofax photocopier.

THE STENCIL PACK

The stencil pack consists of a *stencil sheet,* a *backing sheet,* and a *cushion sheet* (see Figure 12-1). A *typing plate* and a *film sheet* may be used.

Stencil Sheet

The stencil sheet is made of very fine porous fiber with a special coating through which ink will not pass. When the stencil sheet is struck by a typewriter key or drawn or written upon, the coating is pushed aside and the base tissue, through which ink will pass, is exposed.

Backing Sheet

The backing sheet is a heavy, smooth-surfaced sheet on which the stencil is mounted. It smooths over any irregularities in the typing action and gives support to the whole stencil pack assembly.

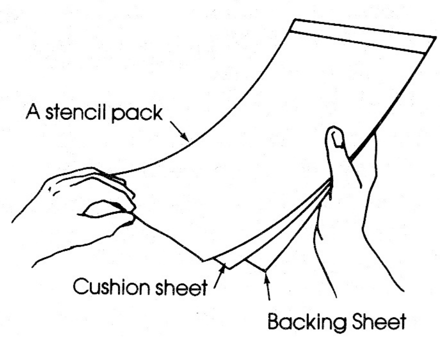


Figure 12-1

Cushion Sheet

The cushion sheet, when inserted between stencil and backing, cushions the impact of the type.

Typing Plate

A typing plate may be used to obtain finer-lined copy. The plate should be placed between the cushion sheet and the backing sheet. If an even finer line is wanted, the typing plate is inserted between the stencil sheet and the backing sheet, and the cushion sheet is not used at all.

Film Sheet

Stencils may be purchased with or without a film sheet, a thin layer of plastic film on top of the stencil. When a film sheet is used, the typist does not need to clean the type as frequently, because the film prevents the wax from sticking to the type. In addition, the plastic film sheet will help prevent letter cutout in letters such as "o" and "p."

PREPARING THE STENCIL

The five steps in preparing a stencil are *planning, placement, typing, correcting,* and *drawing.*

Planning

Standard stencils are printed with guidelines and numerals to assist the typist (Figure 12-2). These lines are only a guide and will not reproduce. The maximum duplicating area of the stencil sheet is a rectangular area outlined by a broken boundary line. On some machines, only copy within this boundary can be duplicated. The left and right margins of the stencil sheet contain a set of numerals which are typewriter line space numbers. The standard spacing is six numerals or lines per inch.

The top edge guideline indicates the position of the impression paper's top edge in relation to the stencil at the time of duplication. This line allows a one-half-inch margin above the first line of copy if the typist begins at line 1. Below the top edge guideline are horizontal scales which show character spacing for both pica (10 spaces per inch) and elite (12 spaces per inch) type.

The stencil has a letter-size margin indicator and a legal-size margin indicator. Warning numerals from 1 to 6 may be seen toward the end of the margin indication. On some stencils, a small, rectangular boundary at the top indicates the margins to be used for postcard stock.

STENCIL GUIDELINES AND NUMERALS

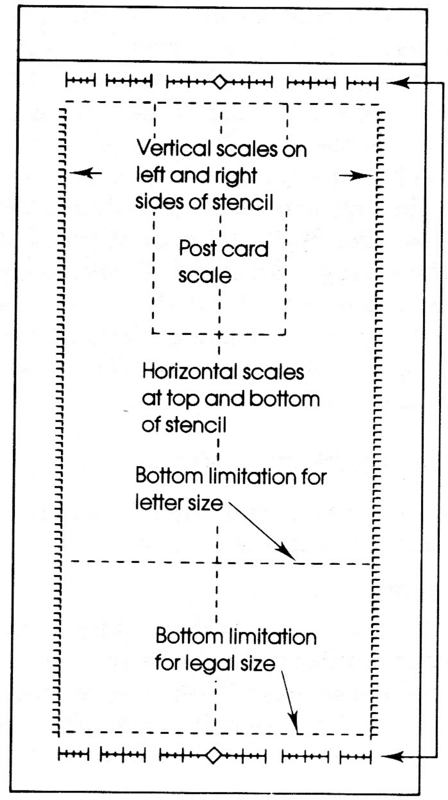


Figure 12-2

Placement

It is often wise—or even necessary—to type a draft copy of material to be stenciled, in order to ensure correct spacing and the most attractive possible format of the final copy. The draft should be typed on a sheet of paper exactly the same size as the impression paper. Use margins identical to those on the stencil to be used. The best possible spacing of text and positioning of headings, tables, charts, and illustrations can be determined when typing the draft and then followed when typing the stencil.

To position the copy on the stencil, place the original between the backing sheet and the stencil, making certain the top edge of the paper meets the top edge of the paper guide on the stencil. Next, apply small dots of correction fluid at the starting points of headings, paragraphs, and other elements of the text. These dots serve as guides and do not affect the stencil or copy in any way. Remove the original and type the stencil, following the guides.

Typing

When typing on a stencil, shift the ribbon to a nonprinting (stencil) position and push the rubber rollers to the ends of the paper bail so they do not roll on the stencil sheet. The type should be cleaned with a brush; use a firm stroke, brushing from in-

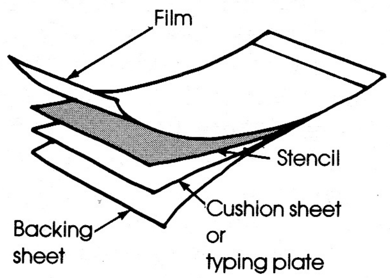


Figure 12–3 To produce sharp copy a cushion sheet or typing plate is inserted between the stencil sheet and backing.

side out. If a cleaning fluid is used, all traces of it should be removed so that the stencil is not harmed.

Insert the cushion sheet (or typing plate) between the stencil sheet and the backing (Figure 12-3). The glossy side should be next to the stencil sheet.

Then insert the stencil pack into the typewriter, and straighten it. To facilitate proofreading, select a cushion sheet in a color that contrasts with that of the stencil. For example, white cushions work well with blue or dark green stencil sheets; blue or black cushion sheets work nicely with white, yellow, or orange stencil sheets. After being removed from the typewriter, the stencil can be proofed by reading the image on the backing sheet.

When using a manual typewriter, type with a uniform staccato touch. If the touch is too hard on either a manual or an electric machine, the centers of such letters as "o" and "p" may fall out, leaving a solid round print area.

The typewriter keys should be cleaned frequently as the stencils are typed, because the wax from the stencil will be transferred to the keys. Proofreading should be done while the stencil pack is still in the typewriter, and again after it has been removed. The second time acts as a double check. The cushion sheet can be removed and used several more times. Turning it end for end helps position it so that different parts are used.

Text editors are useful for making stencils. All necessary corrections can be made before printing out the copy on the stencil.

Correcting

Errors on a stencil should be burnished before they are corrected, in order to replace some of the stencil coating and prevent the fluid from flowing through the base tissue onto the cushion. To burnish, gently rub the error in a circular motion with the rounded end of a paper clip or the top end of a ball-point pen. (Some brands of correction fluid include a glass or plastic rod for burnishing purposes.) Then apply a thin but complete coat of correction fluid to the error, using an upward stroke of the brush. (See Figure 12-4.) An entire word should be corrected by giving one upward stroke to each letter, rather than wiping across the word horizontally. The stencil takes about 30 seconds to a minute to dry before retyping. On a manual typewriter, a lighter than normal touch should be used in typing the corrections.

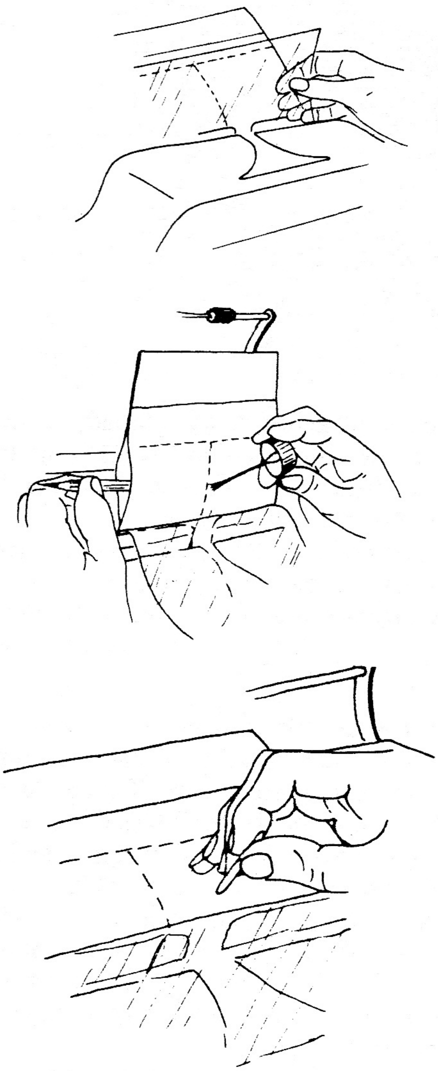


Figure 12–4 To correct an error in a stencil, the film is separated from the stencil sheet, the error is burnished, and correction fluid is applied to the stencil sheet.

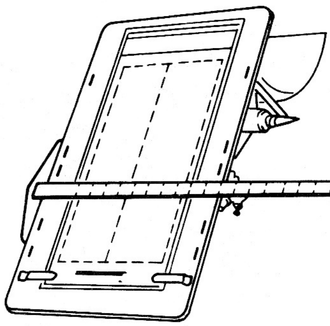


Figure 12-5

If a film is attached to the stencil, it should be lifted from the stencil before burnishing and correcting. The film sheet can be placed back in position after the correction is made.

Corrections on signatures or drawings are made in a manner similar to that described above. Be sure to use light pressure in making the correction.

Drawing

The Mimeoscope, Fluoroscope, or tracing scope is an illuminated drawing board and tracing frame designed for the preparation of stencils (Figure 12-5). The frame holds the stencil on all edges, permitting accurate drawing, tracing, and ruling. A flexible writing plate—a translucent plastic sheet that is textured on both sides—takes the place of the cushion sheet that is used when typing on a stencil. The stencil rests on the grained plate, which eliminates breaks and jagged edges in the lines of the drawing.

The assembly arrangement for making a drawing is as follows: The picture to be traced or drawn is placed on the board with the flexible writing plate on top. The stencil sheet is placed on top of the drawing plate; the backing sheet of the stencil pack is inserted in a slot on the tracing scope and pulled out the back so that it does not interfere. With the aid of the light underneath the board, the artist can then proceed with the tracing or drawing, using the original picture as a pattern.

If an illuminated drawing board is not available, the stencil is placed on a firm, smooth surface before drawing. A satisfactory signature or drawing can be made against just the backing sheet. However, small writing plates are available for use in offices that do not need more than an occasional signature or simple illustration on a stencil. The cushion sheet used in typing should be removed, and the signature plate placed directly beneath the stencil. People with particularly heavy writing pressure sometimes find they make better signatures on stencils (with or without writing plates) by writing through a piece of cellophane.

Various styli, screen plates, and lettering guides are available (Figures 12-6 and 12-7). In tracing illustrations, the wire-loop stylus should be held so that the thinnest part of the loop moves along the line being traced (Figure 12-8). For curved lines, the stylus should be rolled between the thumb and the index finger to keep the thinnest part of the loop on the line at all times. Firm, steady pressure should be used to make a clear, white line on the first try. *A line on a stencil should not be retraced.*

A ball-point stylus should be used for detail work. It should be held as one would a pencil, and enough pressure should be used to produce a clear, white line. Ruled lines should be drawn with a wire-loop stylus, held with the point flat against a T-square. Handwriting or signatures are best done with a roll-point stylus used like a ball-point pen. Writing should be done slowly, with uniform, heavy pressure.

Insets (or inserts) of pictures of other material can be purchased commercially or made on an electronic scanner and inserted into a regular stencil. An insert is attached to a regular stencil in the following way: A stencil illustration is chosen and cut out with a sharp knife, scissors, or razor blade, allowing about a 1/8-inch border around the drawing. A window the size of the illustration is cut in the stencil sheet and the inset is placed under the stencil sheet. The opening is sealed shut by gently rubbing stencil cement in the overlap with the finger tips. Illuminated drawing board clamps can be used to hold the stencil in position during this process. The cement should be allowed to dry before the stencil is run.

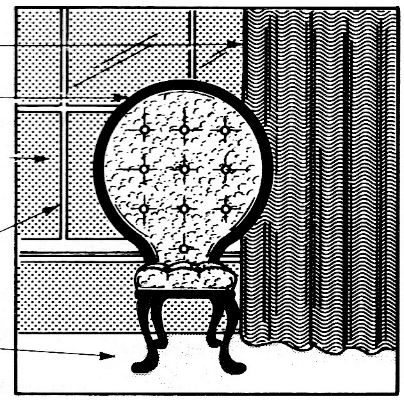
RUNNING THE STENCIL

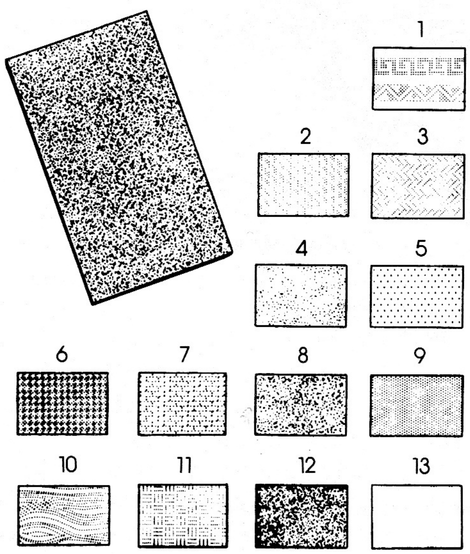
The stencil is placed on the cylinder drum or rollers with the typed side down. Paper is fed through the machine, and the copy is printed as the ink is squeezed through the holes of the stencil and pressed against a sheet of paper.

Each machine will normally have an operational manual in addition to written instructions which are attached to the machine. However, the general steps for running a stencil on any brand of hand-operated or an electric machine are the same (see Figure 12-9):

1. *Get the machine ready.* Place paper on the feed tray. Adjust the rubber grippers and the paper guides for the width of the paper. Check to be sure that the tray which catches the copies is in

1 Border-ornament
2 Diamond weave
3 Herringbone
4 Light splatter
5 5% halftone ben day
6 Plaid
7 Masonry
8 Medium splatter
9 10% halftone ben day
10 Wood grain
11 Basket weave
12 Heavy splatter
13 20% halftone ben day





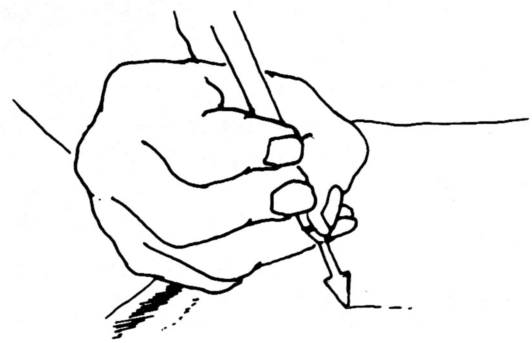


Figure 12–8

Figure 12–6 Screen plates are used to stencilize various shadings and background patterns. They are placed under the stencil sheet and rubbed over with a special screen plate stylus.

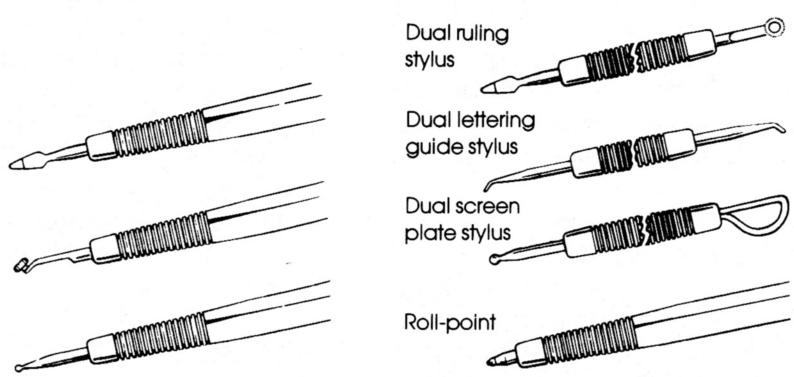


Figure 12-7 Various types of styli are used for stencilizing by hand.

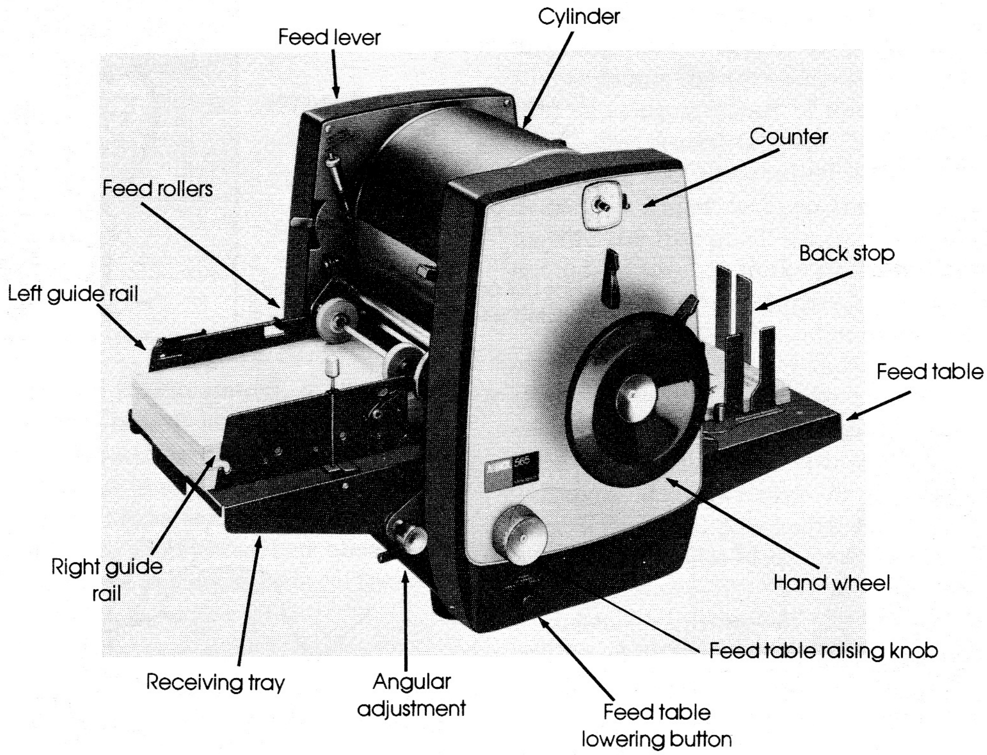


Figure 12-9 A. B. Dick 565 mimeograph. A. B. Dick.

position. Some companies suggest running the machine briefly before attaching the stencil in order to get proper inking.

2. *Attach the stencil to the machine.* Machines using a silk screen over the rollers do not have a cover sheet, but many of the cylinder types have a protective cover sheet that must be removed before attaching the stencil. The stencil is placed (typed side down) on the notches provided, and the backing sheet is torn off. Usually a clamp of some type is fastened. Some operators prefer to rub their hands firmly over the back side of the backing sheet before tearing it off. The backing sheet is no longer needed and can be discarded.
3. *Ink the machine.* Different machines have different ways of being inked. Both liquid and paste inks are available. Some inks are faster drying than others, and the mimeograph paper used with them can be of a smoother, harder finish, resulting in a higher quality of printing. If the ink is turned on and the copy is still too light, chances are that the machine is running out of ink and needs refilling.
4. *Make machine adjustments.* Test copies should be run and checked, as in the fluid process. Different brands of equipment have different adjustments, but all machines should have some method of raising or lowering the copy, as well as slanting the stencil in case the copy is slightly crooked.
5. *Run the copies.* After all adjustments have been made and the copies are carefully checked, run the desired number of copies. A counter is available on most equipment to automatically shut off the machine after the required number of copies has been run. Check frequently to be sure that good copies are still being produced.
6. *Close up the machine.* After the required number of copies is run, the stencil should be removed and filed, if necessary, and the machine left in proper order.

SPECIAL TIPS

Here are some special tips on filing the stencil and suggestions on troubleshooting.

Filing

It is a good idea to save stencils for a short while even though they may never be needed again. Those stencils that will be used again should be identified by one of the following procedures: (1) A filing wrapper, or larger absorbent folder, can be run through the machine; (2) the stencil can be removed from the machine and blotted on the wrapper, reproducing a copy; (3) a copy of the material can be taped or stapled directly to the wrapper.

Open the wrapper and place the stencil in it ink side up. Be careful not to wrinkle the stencil. Close the wrapper by putting the front side down on the ink surface. To absorb excess ink, make a circular motion with your hand or a heavy object across the face of the wrapper. If the wrapper is opened and the stencil taken out and turned over, the stencil will not stick to the wrapper when it dries. The wrapper should be stored in a cool, dry place.

Stencils can be cleaned with kerosene. The process is messy, but all the ink is removed from the stencil to ensure bright copies. Lay the stencil on several sheets of newspaper with the ink side up and with the stub to the left to make it easier to hold. Brush the kerosene in one direction onto the stencil with a paint brush. If you are right-handed, the easiest way is to hold the stencil with the left hand, brushing away from it. When the ink feels slippery, place newspaper on top of the stencil and rub it with a cloth. (If rubbing is done directly on the surface of the stencil, the stencil may tear or wrinkle.) After the stencil is clean, place it in a file wrapper and store it.

Troubleshooting

Setoff

Setoff—ink deposits on back of the duplicated material—is caused by one sheet dropping on another before the first sheet is dry. The machine may be over-inked, or perhaps a quicker-drying ink is required. Another solution is to slip-sheet, or interleaf; that is to place a sheet of paper (sometimes specially prepared) on top of each copy as it comes from the drum so that there will be no smearing or setoff on the back of the papers.

Closed Characters

If characters are closed and not sharp and clear, the typewriter keys need to be cleaned.

Poor Corrections

If corrected errors show up darker than the rest of the text on the printed copy, too much typing pressure was used in retyping. An incomplete correction is caused by not completely covering the error with correction fluid or not allowing the fluid to dry completely before retyping.

Poor Copy Quality

If the duplicated material is of poor or uneven quality, the typing touch may be too light or inconsistent. A firm, staccato touch should be used. Electric typewriters should present few problems unless the typebars are out of alignment. The multiple-copy control should be adjusted so that the stencil is tight against the cylinder or platen. If letters such as "o" and "e" are cut out, the type may have been too sharp or the keys struck too hard. A film sheet should solve this problem.

Poor Signatures

If signatures do not come out clearly, too little pressure may have been used. A writing plate or a hard surface may solve the problem.

Copy at Bottom or Sides Not Printing

On some stencil machines, the material will not print unless it is within the boundary lines marked on the stencil. Other machines will print on the extreme edges of the paper.

Certain Spots Not Printing

On drum machines. When dry spots appear on the copy, ink can be painted on the front of the flannel pad directly under the stencil. Occasionally the flannel pad can be detached at one end and the pad raised (aerated) to loosen the fibers. (If this is done, the ink will not clog the fibers.) When aerating no longer takes care of dry spots, it is time to change the pad.

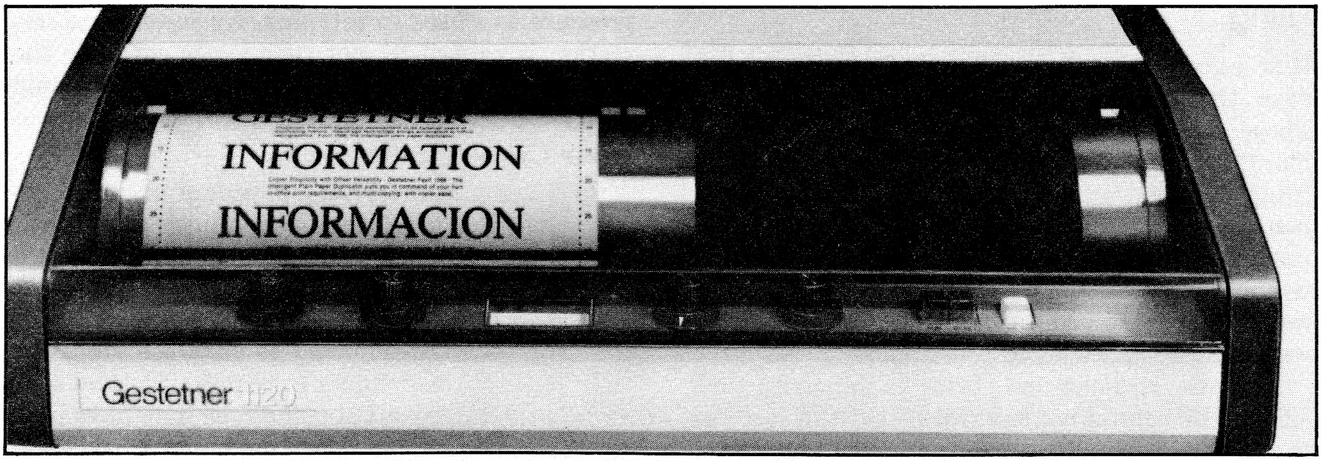
On roller machines. The machine may have an attachment that can be set to ink the total silk screen, the left side, the right side, or the center spread.

SPECIAL TECHNIQUES

Two current technological advances in using stencils are the electronic scanner and the thermal stencil.

Electronic Scanner

The electronic scanner is a device that scans an original and creates a stencil that will produce up to 10,000 copies (Figure 12-10). Reproductions of drawings, pasteups, printer's type, clippings from magazines and newspapers, and halftones can be made directly from the original—saving time in



Gestetner.

Figure 12–10 Gestetner 1120 electronic scanner.

retyping, drawing, and proofreading, and eliminating the worry of errors.

The original copy is placed on one drum of the scanner, and a special scanner stencil (a dark blue or black stencil which cannot be typed or drawn on) is placed on another drum. The more expensive scanners have settings for special features, such as picking up only certain colors or a specified amount of background; however, the less expensive scanners simply have an on/off button. The scanning procedure takes from four to twelve minutes, but the machine can be left unattended. At its completion, the stencil can be taken to a mimeograph machine and run in the normal manner.

Any graphic material—including pen, pencil, crayon, printing—will reproduce on electronic stencils. Proper selection and modification of this material will assure the best possible quality. All colors reproduce as black or varying shades of gray. Red, dark blue, purple, orange, and dark green will reproduce as black or very dark gray. Pink, light blue, or light green will reproduce as light gray. Color work can also be done (see the following section, "Color Work"). If the originals are hand drawn, stencils can be scanned separately for each color. If the colors are an inch or more apart, mimeograph ink can be painted on a color pad, as described earlier. Some of the more expensive scanners can be set to pick up certain colors of a picture; thus, by making several stencils, accurate reproductions of an original can be made.

Most electronic scanners will also make transparencies and copies. However, the waiting time makes this machine impractical for making copies, except in an emergency when no other photocopier is available.

Thermal Stencils

The thermal stencil can be used as an ordinary stencil, but it can also be used on a thermal photocopier to produce a stencil automatically. As in the case of the electronic scanner, all the advantages of not having to produce the original exist. Pasteups can be used; originals can be taken from magazines or newspapers.

Pasteups for either electronic stencils or thermal stencils are made by using rubber cement to paste the copy on a white sheet of paper. (Cellulose tape should not be used, as it will show up on the stencil.) Black ink and a clean dark type are required. Cotton ribbons should not be used, as the mimeographed copies will be fuzzy. Lettering (such as Presto-Type, Add-a-Type, Prestype, Fototype, etc.) or illustrations can be purchased and used for professional-looking copy.

Any copy that is faxable (that is, contains carbon or graphic-based text) can be used in preparing a thermal stencil. Before imaging a stencil, the carrier belt or glass rollers should be checked to be sure that they are free of dust or dirt. (Small particles will produce pinholes in the thermal stencil.) The original is inserted between the stencil and the backing sheet with the copy side up (Figure 12-11). The thermal copier is set at a slower or darker setting than that normally used for copy paper; then the original is run through the machine in the usual method. After imaging, the top tissue should be slowly peeled away from the stencil and discarded. Then the stencil is slowly peeled from the original and run in the normal manner on the mimeograph machine.

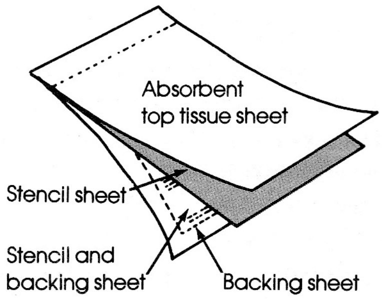


Figure 12–11

COLOR WORK

It is often desirable to emphasize headings or other significant material by using an ink color different from that of the main body of text. Color may also be used simply to create a more attractive appearance. Most ink process machines will reproduce in several colors, but the operator usually has a choice between two methods for such work. These two methods are explained below in general terms, but each operator should check the operating manual for the particular brand of machine to be used before attempting color work. The most common ink colors available are black, red, green, blue, purple, brown, and yellow.

Removing the Drum

On some machines, the entire drum can be lifted out, stored in a cabinet, and replaced by another drum containing the desired color of ink. On roller machines, the two rollers can be similarly removed and replaced. The stencil will be printed in the new color. The drum (or set of rollers) is changed for each color desired, and a different stencil is typed or drawn for each color. Only the material to be printed in one particular color is cut into a stencil. The mimeograph machine will give exact registration when the copies run. Perfect placement of material on the stencils allows multiple-color work to be aligned and incorporated into various designs.

Correction fluid can be used for markers or guidelines in making a multi-color, multi-stencil drawing. To check registration or placement, the stencils can be laid on top of each other on an illuminated drawing board.

Using Color Pads

Color pads provide a more economical method of producing color work on the mimeograph. They also eliminate the need to store several bulky drums or rollers.

A special paper-and-cloth pad is placed on the drum, covering the black ink. The pad is placed with the waxy-coated paper side down to prevent the black ink from seeping through, and the cloth side is painted with ink of the desired color.

If only a small portion of a stencil is to be of a certain color, the steps shown in Figure 12-12 can be followed to make an outline pattern on the pad. Then only the area within the lines needs to be painted with the colored ink.

More than one color can be run at one time in this method, if the colors are at least one-half inch apart. If the colors must be closer, a separate stencil and a separate color run should be made for each color.

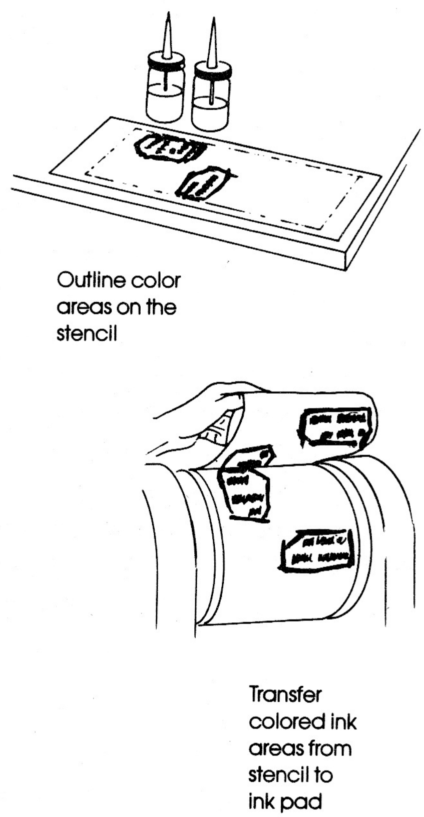


Figure 12–12 To produce only a small area of color, color areas are first outlined on the stencil. The colored ink areas are then transferred from the stencil to the ink pad.

SUMMARY: ADVANTAGES AND DISADVANTAGES OF THE STENCIL PROCESS

ADVANTAGES	DISADVANTAGES
1. Copies cost less than a half cent apiece if several hundred are run. Operator and mechanical costs are low.	1. A stencil must be prepared in order to make copies of an original; thus, typographical errors can occur.
2. Copies are legible and copy is in a clear black.	2. The number of copies that can be produced from one stencil is limited to a few thousand.
3. Stencils are not messy and are easy to prepare. Corrections are easily made.	3. The machine operation can become messy unless the operator is trained properly.
4. Stencils can be reused on a broad range of copy-paper weights.	4. Color is possible, but involves extra equipment and time in running. The colors produced are not brilliant. The use of color can become messy.
5. After preparation of the stencil, over 100 copies a minute can be made.	
6. Anyone can run the machine with a few minutes of instruction.	
7. The use of text editor can eliminate the need for making corrections on the stencil.	

REVIEW QUESTIONS

True/False

Directions: Write a "T" in the blank if the statement is true, and an "F" if the statement is false.

_______ 1. Today, even halftones and photographs can be reproduced using the stencil process.

_______ 2. Stencil duplication was invented less than 25 years ago.

_______ 3. The stencil process employs a very fine porous sheet of tissue, which is coated with a waxlike substance that readily absorbs ink.

_______ 4. Long-run stencils should be used if the stencil is to be rerun at a later date.

_______ 5. Stencils are available for address labels, maps, and music.

_______ 6. It is often wise to type a draft copy of material to be stenciled, in order to ensure correct spacing and the most attractive possible format of the final copy.

_______ 7. When typing a stencil, the typist should shift the ribbon to the stencil position and push the rubber rollers to the ends of the paper bail.

_______ 8. The round end of a paper clip or the top end of a ball-point pen can be used to burnish errors on a stencil.

_______ 9. An incorrect word typed on a stencil should be corrected by wiping correction fluid horizontally across the word.

_______ 10. It is now possible to create stencils on thermal copying machines.

Multiple Choice

Directions: In the blanks, write the letter of the choice that best completes each statement.

_______ 1. Which of the following is *not* a part of the stencil pack?
- a. the stencil sheet
- b. the backing sheet
- c. the cushion sheet
- d. the protection folder

_______ 2. What is the name for the illuminated drawing board and tracing frame designed for the preparation of stencils?
- a. Mimeoscope
- b. tracing scope
- c. Fluoroscope
- d. all of the above

_______ 3. When attaching the stencil to the machine, the operator should make certain that the stencil is placed
- a. on top of the cover sheet
- b. with the typed side up
- c. with the typed side down
- d. either typed side up or typed side down

_______ 4. Setoff is
- a. ink deposits on back of the duplicated material
- b. a double image
- c. material that runs off the page
- d. margins that need to be adjusted

_______ 5. A stencil that is produced electronically can run as many as
- a. 1,000 copies
- b. 2,000 copies
- c. 5,000 copies
- d. 10,000 copies

SUGGESTED ACTIVITIES

a. Choose a selection from Appendix, "Production Work," page 162 to use as copy for typing a stencil. Type and draw on the stencil. Make corrections.

b. Run 25 copies of the stencil you made for Activity A. Evaluate their quality and clarity compared with the original.

c. Invite a speaker from a local duplicating machine vendor to demonstrate special techniques in making and running stencils.

Part IV

IMAGING DEVICES AND INTEGRATED SYSTEMS

13

WORD PROCESSING

Objectives

After completing this chapter, you will be able to:

1. Trace the evolution of word processing.
2. Identify the various phases of word processing.
3. List the advantages of using text editors.
4. List and describe the types of stand-alone text editors.
5. List and describe the types of multi-terminal text editors.
6. Describe the common and advanced features found on text editors.
7. Describe the impact and nonimpact printing devices used on typewriters or text editors.
8. Describe the major types of external storage media.
9. Describe the internal storage media of text editors.

Word processing is much more than just another form of typewriting. The American National Standards Institute defines it as the "transformation of ideas and information into a readable form of communication through the management of procedures, equipment, and personnel." In simpler language, word processing equipment (or text editor) stores and manipulates words and figures electronically. The information can be edited, moved, or reformatted, and material can be added or deleted without making a *hard copy*—that is, without printing a single character on paper. Because multiple copies can be produced rapidly on a text editor, it is considered to be an *imaging device*. In the office, a text editor is convenient for printing out error-free copy on regular paper, carbons, fluid masters, stencils, or offset originals.

EVOLUTION OF KEYBOARDING SYSTEMS

Christopher L. Sholes is acknowledged as the inventor of the typewriter, which was patented in 1868. During the 1920s, the electric typewriter was introduced. The late 1950s and early 1960s saw the influx of computers, made possible by the availability of compact and relatively low-cost electronics and new magnetic storage/recording media. IBM coupled this technology with the Selectric, which had been introduced in 1961, and designed the Magnetic Tape Selectric Typewriter (MT/ST) in 1964. This tape cartridge typing system began an era of technological advances in the new world of word processing. In 1969, IBM introduced the Magnetic Card Selectric Typewriter (MC/ST), a word processing typewriter that employed a reusable magnetic card storage medium. Within a few years, other companies entered the competition. The first video display systems were introduced in 1972. (See Figure 13-1.)

The content in this chapter is adapted from *Keyboarding Systems* by Mimi Will and Joyce Kupsh which was published by National Instructional Systems, Inc.

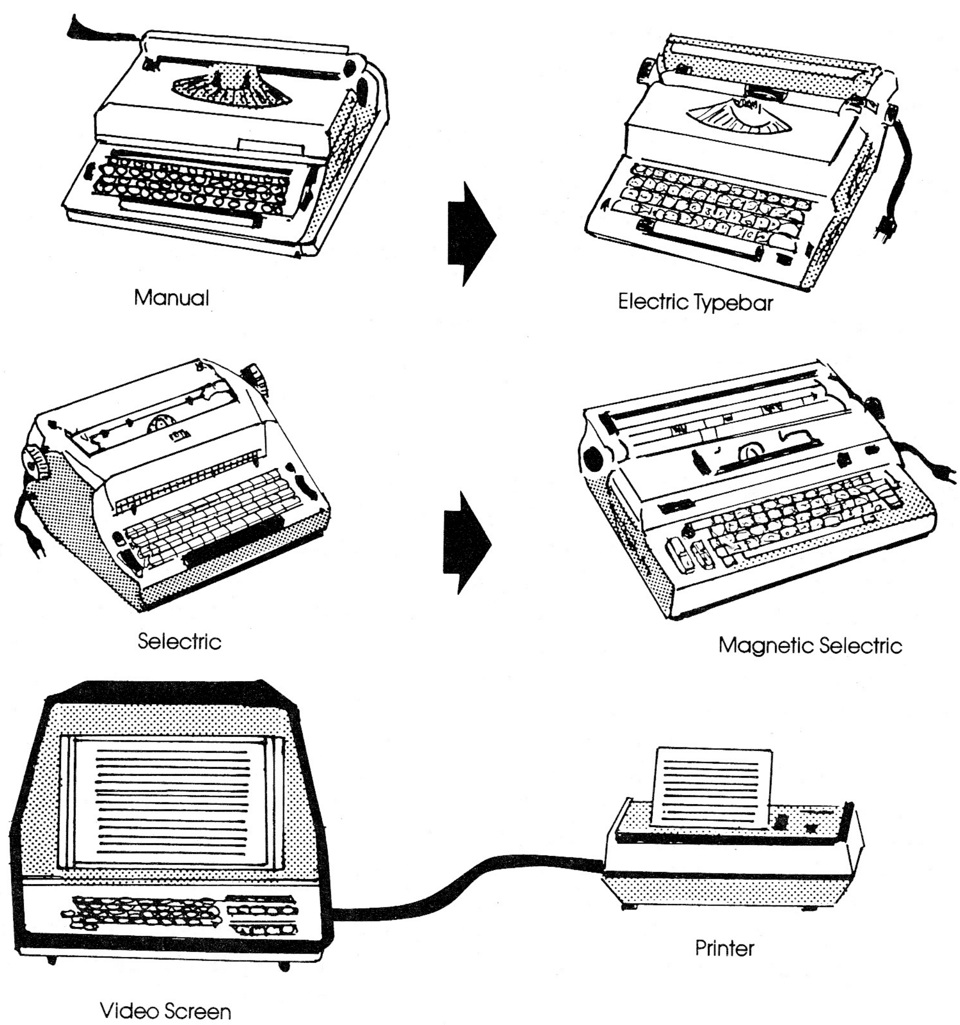
PHASES OF WORD PROCESSING

A word processing system is comprised of *input, processing,* and *output* (Figure 13-2). The *input,* or material requiring processing, may be in the form of longhand, shorthand, machine dictation, or a typed draft. The *processing* takes place in text-editing equipment, such as an electronic typewriter, a stand-alone mechanical text editor (see below), or a video terminal. Output, or the finished product, may be in the form of keyboarded paper, or hard copy, or it may be on magnetic media, such as magnetic cards or disks. It may even be in the form of digital signals transmitted across telephone wires and received by a similar communicating word processor at a remote location (this process is sometimes called *electronic mail*).

The word processing system speeds the production cycle by utilizing a well-defined set of procedures, sophisticated text-editing equipment, and the resourcefulness of trained professionals running the system within a suitable working environment.

TEXT EDITORS

Text editors, as imaging devices, have many advantages in the business world of today. The physical components, mechanisms, parts, or assemblies that make up a business machine are called *hardware. Software* is a term used to describe the programs that control machine operation and functions. Specific instructions that have been permanently placed or wired into the control



National Instructional Systems, Inc.

Figure 13–1

memory of the equipment are known as *firmware*.

Over fifty companies are presently manufacturing text editors, but all can be classified either as stand-alone text editors or multi-terminal systems. Within each category are some significant subclasses. In the following sections, the advantages of text editors are described; then the common features and more advanced features available on these machines are discussed; and finally the types of printing devices and storage media used in word processing are explained.

Advantages of Text Editors

Using text editors to prepare finished keyboarded copy has many advantages, among which the most valuable is the saving of keystrokes. Keyboarded communications which contain errors or need revisions do not have to be rekeyboarded but may be merely edited. Productivity improves because time is not wasted in rekeyboarding documents to be revised. The "peaks and valleys" workload of office personnel levels out as job responsibilities become more specific.

Text editors simplify document processing, and produce documents of higher quality appearance, with more uniformity than is possible with typewriters. Revisions are so easy to make that it is almost a pleasure to accept work to be corrected or changed.

Keyboarding personnel soon become confident in their production capabilities. There are many career options available for word processing personnel in related areas, such as document preparation, supervision, graphics and phototypesetting, nontyping administrative support, data processing, and records management.

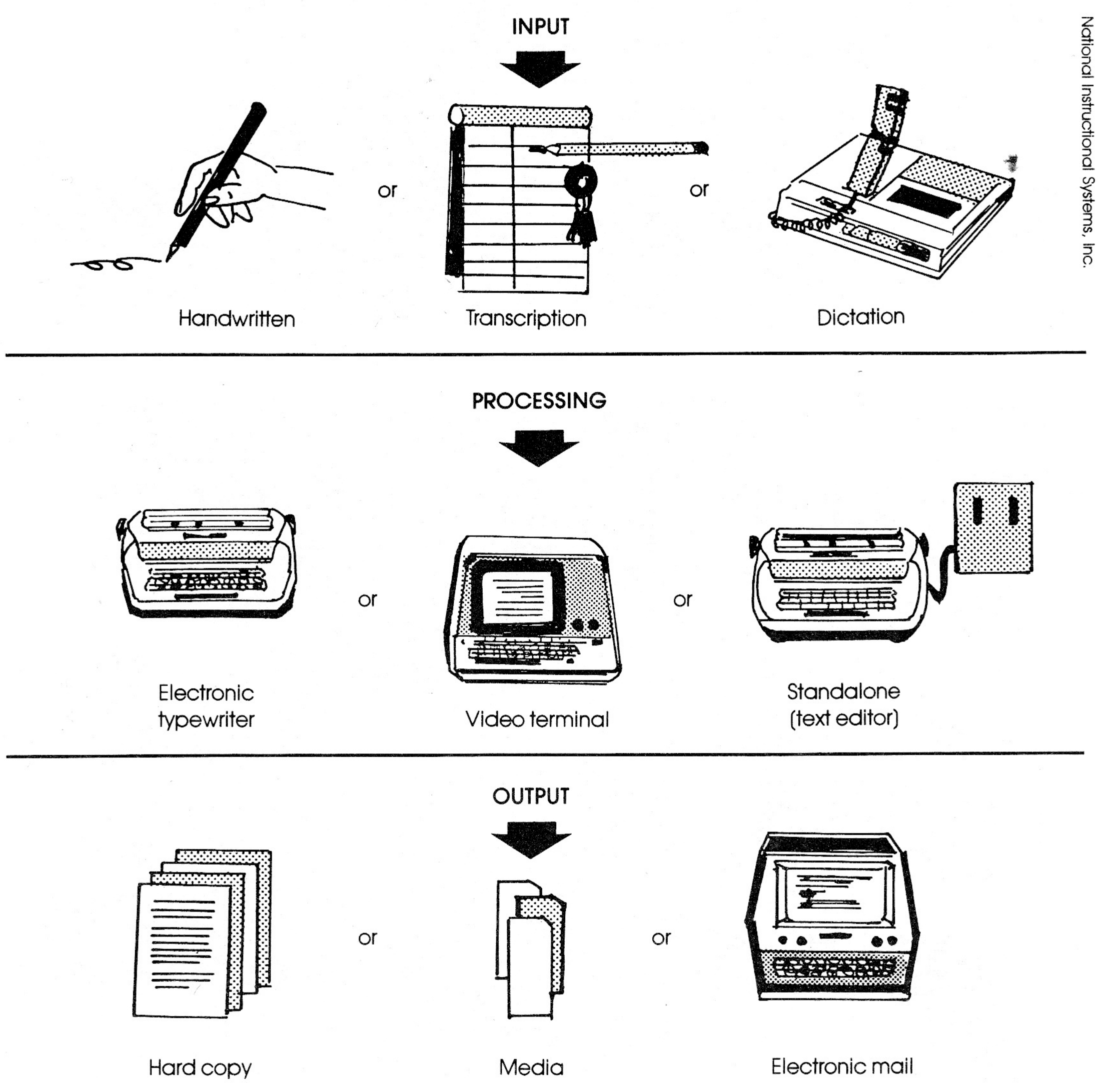


Figure 13–2

Classifications

Text editors can be divided into stand-alone text editors and multi-terminal word processing systems.

Stand-Alone Text Editors

A stand-alone text editor consists of a single work station that contains its own control logic—that is, its own computer. Three types of stand-alone equipment are *electronic typewriters, mechanical systems,* and *display-based systems.* (See Figure 13-3.)

Electronic Typewriters. The electronic typewriter was introduced in 1978. The first model was called the Intelligent Typewriter and it was marketed by Exxon. Other companies have entered the electronic market, and it is expected that within a few years almost every typewriter vendor will have an electronic typewriter to offer.

Electronic typewriters feature small memories that can electronically store a few hundred keystrokes before printing them out. In addition, the electronics incorporate a number of automatic features, such as centering, error corrections, numeric alignment, underlining, and carriage return (Figure 13-4).

Mechanical Systems. Mechanical systems have been available since the mid-1960s. They use magnetic cards, cassettes, tape cartridges, or diskettes for storage. They are sometimes called *blind systems,* by contrast with video-display systems. These systems are appropriate for page-length documents such as letters and for other page-oriented applications.

Display-Based Systems. During the late 1970s, several companies introduced a one-line or partial-line CRT (cathode ray tube) display. Display-

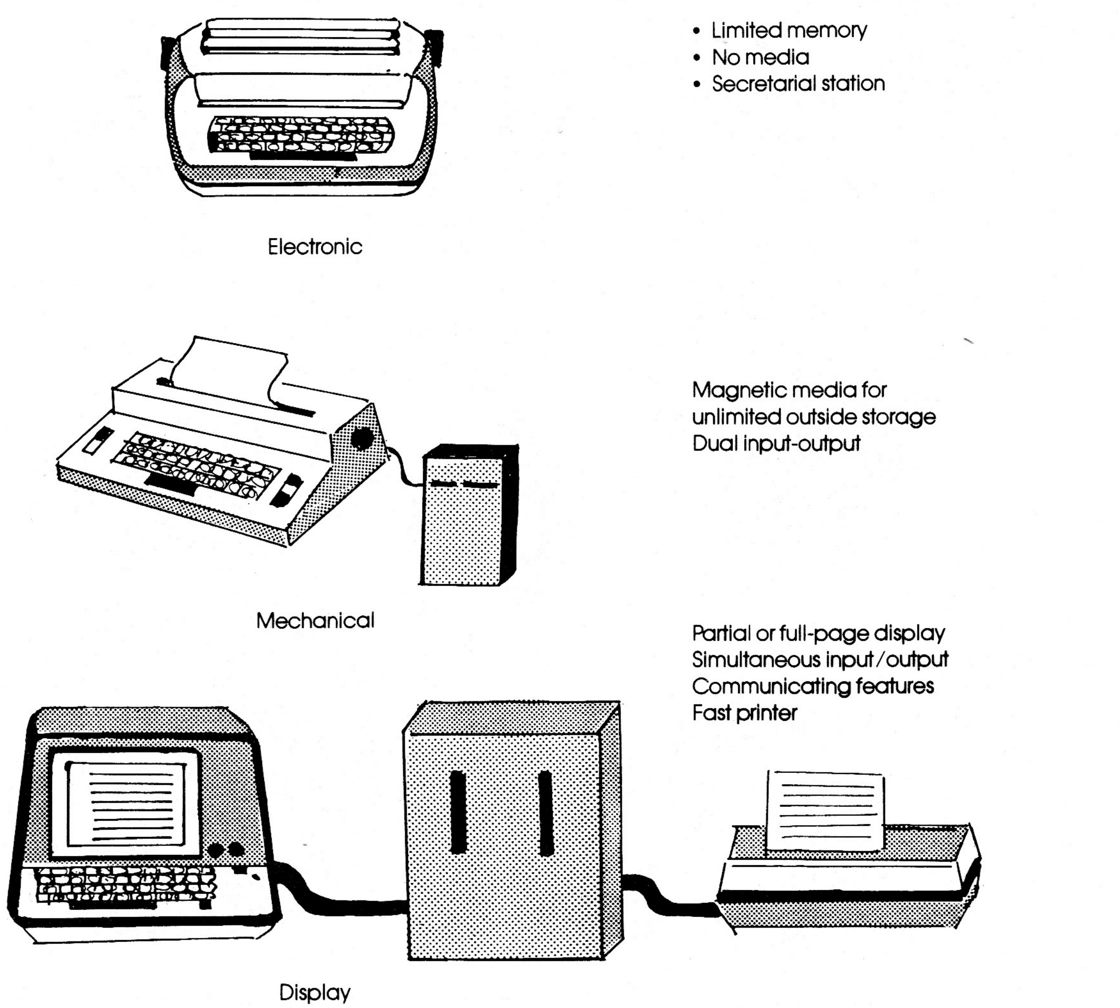


Figure 13-3

based systems now offer a video display of one line, a partial or full page, and a dual display of instructions and full-page display. (See Figure 13-5.) Text is keyed, edited, and changed on the display before being printed.

Through display-based systems that share common information resources, word processing, data processing, records processing, and communications are being integrated in an electronic office technology called *information processing*. Information processing combines electronic mail, personal computing, computer graphics, voice mail, personal calendar, and other applications.

Multi-Terminal Systems

Multi-terminal word processing systems (Figure 13-6) are used in large companies or in any situation where it may be desirable to share such resources as printers and storage media.

Exxon.

Figure 13–4 Exxon Qyx intelligent typewriter.

AM Jacquard.

Figure 13–5 AM Jacquard Systems J425, with full-page display.

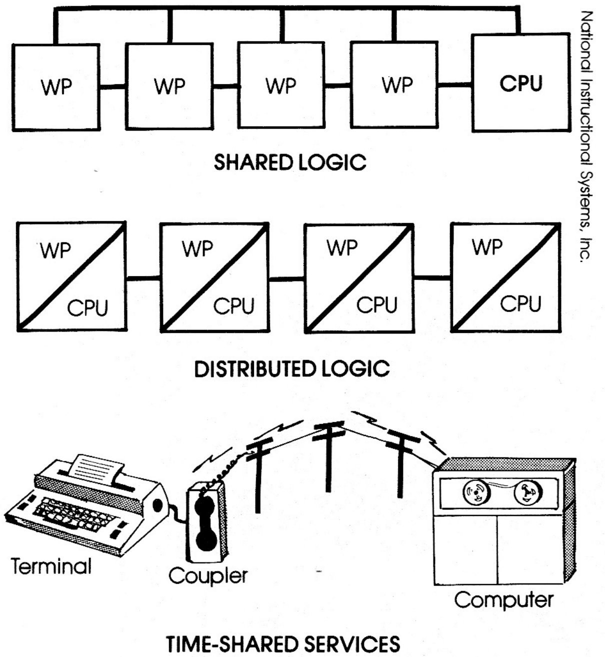


Figure 13–6

Shared-Logic Systems. In a shared-logic system, several keyboarding terminals share the logic (or computer brainpower) and storage component of the central processing unit, thus spreading the cost of the system among a number of keyboard stations.

Shared-logic systems are generally located in-house and are centralized within the organization. The sharing of computer logic enables several office employees to use keyboard terminals and work on different sections of the same document at the same time. This feature can be a tremendous timesaver on a lengthy project with strict time constraints.

Most shared-logic systems use floppy disks for storage and are equipped with visual screens. A distinct advantage of shared-logic systems is that users can expand and upgrade the system by adding terminals as the workload increases. The primary disadvantage is that when the main computer goes down all terminals are down too.

Distributed-Logic Systems. A distributed-logic system looks like a shared-logic system but the logic (the memory and computing power) has been dispersed to the terminals, the printers, and the storage centers of other peripherals or auxiliary equipment. Therefore, a malfunction of one particular station would not shut down the entire system, because the components operate independently even though they are integrated.

Time-Shared Services. While the previous three systems are normally internal (housed within the company), a time-shared service is generally external. Time-sharing services accessed through telephone lines allow office keyboard terminals to hook into a powerful computer located elsewhere. Many users share the time of the large computer. The computer's central processing unit is owned by a service bureau. Since many organizations use the computer, or share computer time, the user cost is greatly reduced. Keyboarded copy can be revised on the users' terminals, but the normal procedure is to print copy on a high-speed printer in the service bureau and deliver it to the users.

Charges for time-sharing service include:

1. Telephone connection time
2. Immediate-access storage
3. Telephone terminal rental
4. Use of high-speed printers and special processing
5. Length of time data is stored on computer system.

FEATURES OF TEXT EDITORS

The features of text editors vary greatly from brand to brand. The first list below describes the more common features; the second describes advanced features that are becoming more widely available.

Common Features

The following features are common to most text editors.

Storing Keystrokes

A text editor stores keystrokes in memory. These keystrokes can be printed one or more times as needed without rekeyboarding (Figure 13-7).

Inserting and Deleting

Editing of copy is accomplished by inserting or deleting a keystroke, a word, a line, or an entire paragraph.

Correcting

Simple corrections are made by backspacing; the error is erased from the computer's memory and from the display screen simultaneously.

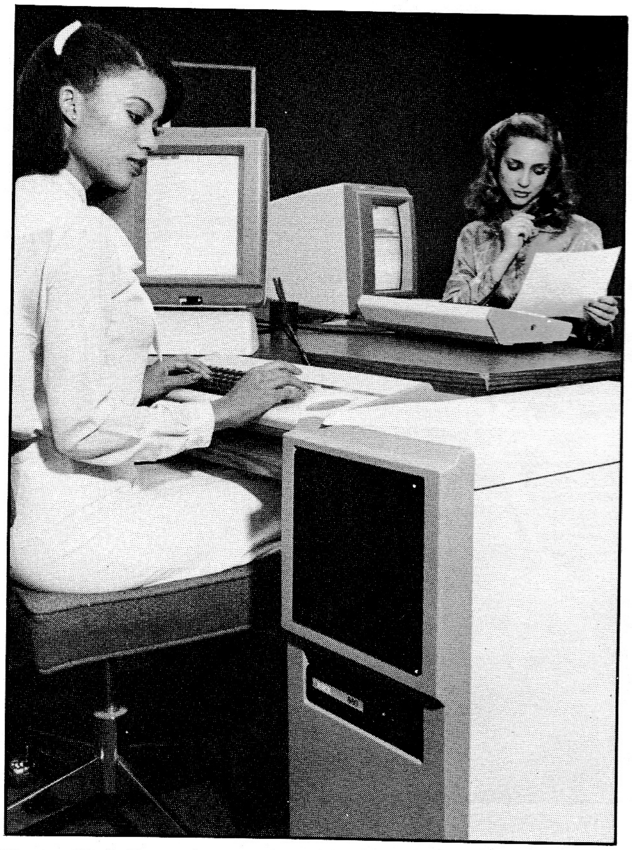


Figure 13–7 Xerox 860 information processing system.

Unattended Play Out

Continuous-form paper can be used to print out keystrokes. No operator need be present, because the printing is automatic.

Automatic Functions

Features found on text editors that reduce the number of keystrokes include the following:

Centering. The text editor automatically centers words on a line without the need to count characters.

Underscoring. The text editor underscores a word or group of words without keystroking each underscore.

Tab Grid. The text editor sets up tabs at frequent intervals (for example, every five spaces) along the length of the typing line.

Carriage Return. The carriage of the text editor returns to the left margin after reaching the right margin "hot zone" (an area 6 to 10 characters wide which is sensitive to accepting too many keystrokes).

Other Features. Different brands of text-editing equipment have slightly different features. Many special features are activated by using code keys, which command the equipment to perform particular functions.

Advanced Features

The following more advanced features of text editors are commonly found on multi-terminal systems.

Global Search and Replace

The global search and replace scans through a document for user-defined words or sets of characters, and replaces them with new ones as specified in the command.

Columnar Interchange

The columnar interchange allows the operator to switch around whole columns of information automatically, placing columns in a different sequence across the screen.

Justification

Justification adds space within the line of type to produce a straight rather than a ragged right margin.

Filing and Sorting of Lists

The filing and sorting feature allows the operator to file data alphabetically, and then later select and recall desired information.

Decimal Tab

Some text editors automatically align decimal points in columns of numbers.

Footnoting Capability

Text editors with footnoting capability will set the bottom margin of each page to allow space for the footnotes.

Scrolling

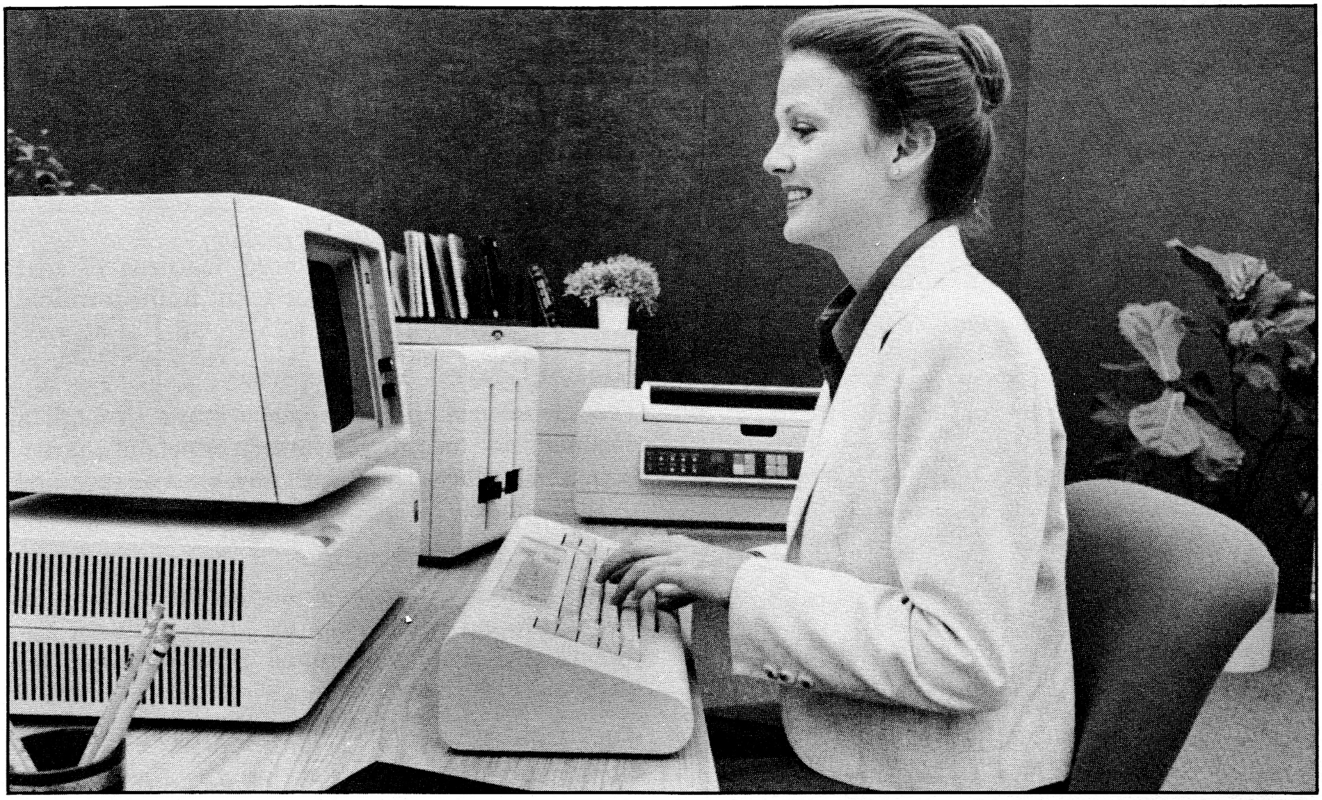
Scrolling allows the operator to scan a document horizontally, vertically, or by the page.

Merging

Merging allows the operator to combine selections of existing text to form a new document.

Dictionary

The dictionary feature checks the spelling of every word against a glossary contained in the software (Figure 13-8). The most common words are included, but the operator can also program in specialized terminology.



IBM.

Figure 13–8 IBM Displaywriter system.

PRINTING DEVICES

Printers can be classified as *impact* or *nonimpact*. Several different devices are available in each category.

Impact Printers

Impact printers produce copies in the range of 175–700 wpm (words per minute), using one of five different printing methods.

Typebar

The typebar was the method used on the original typewriter, and was standard for many years. A metal typebar strikes the paper through a cloth or film ribbon, producing characters on the paper. Since typebars cannot move very fast and can become jammed, they are not used on today's text editors.

Element

An element (or font) contains all of the printing characters on a metal ball or element. An element can be removed and replaced with others bearing a different typeface or type size. Since the introduction of the printing element on the IBM Selectric typewriter, other manufacturers have adopted it. Output speed for printing elements is still relatively slow (150–175 wpm) compared with other technologies now available.

Daisy Print Wheel

Daisy wheels are capable of printing at faster rates than either typebars or elements (approximately 350–650 wpm). First introduced in 1974, the daisy wheel resembles the petals of a flower and has a different letter on each spoke. Bidirectional printing, in which the printing device moves from left to right on one line and then from right to left on the next, is possible on some print wheel systems and offers increased output speeds.

Thimble

The NEC Spinwriter uses a thimble—a cup-shaped printing element resembling a daisy wheel—which offers high output speeds, bidirectionality, and easy replacement.

Dot Matrix

The matrix printer, which was originally used for data processing output, prints by pushing a number of needlelike rods against the paper. The group of closely spaced dots can produce characters in a variety of sizes, styles, and degrees of dark-

ness. Matrix printers are less expensive than other printers, but the quality of printing isn't as good.

Nonimpact Printers

Nonimpact printers are fast and noiseless. Since no printing element strikes a platen, carbon copies are impossible on nonimpact printers.

Ink-Jet

On an ink-jet printer, characters are formed by the spraying of electrostatically charged droplets of ink onto paper. High speeds of 1,000 wpm or more are possible, and the ink is fast-drying. The ink-jet method was originally developed for use in data processing. It was introduced in word processing equipment in 1976 and gained acceptance because of its quality appearance and high speed.

Laser

A laser printer uses a laser beam (an intense, narrow beam of pure red light) to shape a character on a photosensitive surface—which may be paper or an offset plate. Speeds of laser printers vary from 90 to 600 pages per minute; a wide variety of type styles and sizes can be used. Laser printing was also first used on data processing equipment, but is now being used on more advanced word processing equipment.

Fiber Optics

Fiber optics technology involves a glasslike tube (as thin as a strand of human hair) that transmits light from one location to another. The light source changes digital signals into light pulses which are transmitted at very fast speeds. At the end of the tube, a device changes the varying intensities of light into signals that the receiving machine can recognize, and the received impulses operate an impact or nonimpact printer.

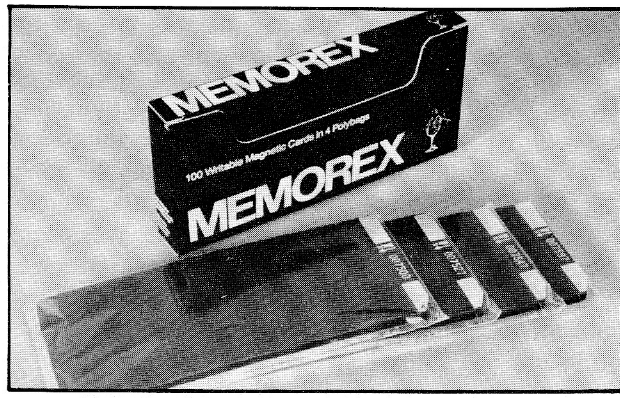


Figure 13–9 Memorex magnetic card.

Eastman Office Supplies.

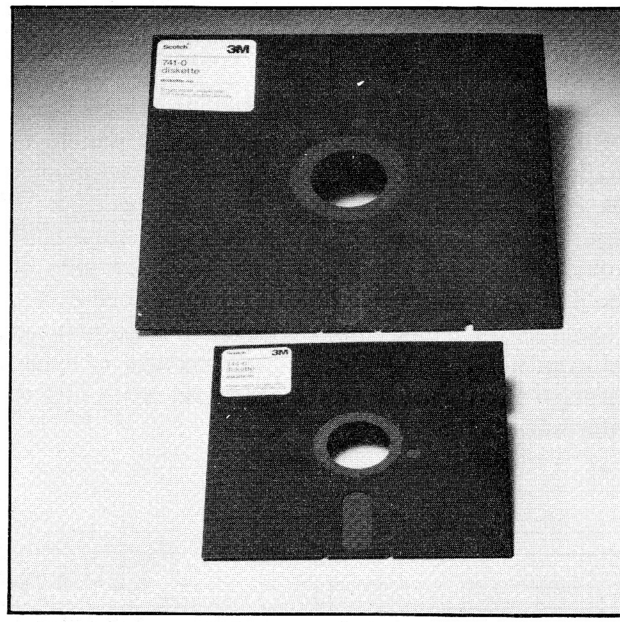


Figure 13–10 3M mini and flexible diskettes.

Eastman Office Supplies.

STORAGE MEDIA

The storage of data (such as characters and format commands) is both *external* (outside the text editor) and *internal* (within the text editor).

External Storage

External storage may be in the form of paper tape, magnetic tape, magnetic cards, or different types of disks or diskettes.

Paper Tape

Paper tape is a strip of paper on which characters are represented by combinations of holes punched across the strip. The first automatic typewriters and phototypesetters used this method to produce form letters, much as a player piano plays out a music roll.

Magnetic Tape

Magnetic tape is a plasticlike tape coated with a ferrous (iron-bearing) compound on which information may be stored. Tape is available as cartridges, reels, or cassettes. The tape can be erased and reused indefinitely.

Magnetic Card

Magnetic cards are the same size as data processing punched cards. The cards are made by coating pieces of plastic with a magnetic particle coating, similar to that on magnetic tape. Approximately 50 lines of information (one single-spaced page or two double-spaced pages) can be stored on one card. Some dual-sided magnetic cards allow the user to

record on both sides. The cards may be reused by erasing and recording over the original.

Disk or Diskette

The *floppy disk* is rapidly replacing the magnetic card as the common storage medium. One 8½-inch disk, which is made of magnetic plastic and resembles a soft 45-rpm record enclosed in a plastic jacket, holds approximately 60 pages of material. The information on the disk is stored and retrieved by *random access,* a method by which information can be stored in any order that is wanted. A *flippy* (or dual floppy) is a double-sided diskette that uses both sides for storage of data. *Mini-floppy disks* (5¼ inches in diameter) have a smaller storage capacity of about 30 pages.

Winchester Disk

A *Winchester disk* is a hard disk that can store millions of characters. A hard disk, which is thicker and firmer than a floppy disk, resembles a fat 33-1/3 rpm phonograph record. The disk is mounted on a rotating disk drive and spins continually. Reader heads can access either side of the disk. A disk pack contains several hard disks. *Videodisc* technology uses even more concentrated information storage in the same amount of space through the use of lasers to read and write bits of information.

Internal Storage

Storage of information inside the automated equipment is called *internal storage* or *memory.*

Core Memory

Core memory, the basis of computers, consists of large numbers of iron circles like little doughnuts, each smaller than the head of a pin, which are strung together like beads on a wire. The iron circle is magnetized and holds one bit of information (a *bit* is a character or space).

Computer-on-a-Chip

Formerly, computers weighed 30 tons and used about 1,600 square feet of floor space. Today a tiny chip of silicon, only one-fifth of an inch square, functions as a complete computer. This chip is frequently called a *microcomputer.* A single chip can store one million bits or more of information.

Bubble Memory

One of the newest technological advancements in media storage is the bubble memory which is even more reliable, faster, and more compact than other technologies. Tiny magnetized bubbles float free on a surface of metal and can move around to expand or contract the amount of information stored. An area 1-inch square could store about 100 pages of the Manhattan telephone directory.

REVIEW QUESTIONS

True/False

Directions: Write a "T" in the blank if the statement is true, and an "F" if the statement is false.

_______ 1. The three essential elements in word processing are procedures, equipment, and personnel.

_______ 2. Carbon copies cannot be made on a nonimpact printer.

_______ 3. Winchester disks are floppy diskettes capable of storing millions of characters per disk.

_______ 4. A magnetic card can store approximately 50 lines of information.

_______ 5. Storage of information inside automated equipment is called external memory.

Matching

Directions: In each blank, write the letter of the term that matches its description.

_______ 1. the product of printing device

_______ 2. a single-station machine that contains its own control logic

_______ 3. a multi-terminal configuration in which several keyboarding terminals hook into the central processing unit

_______ 4. a multi-terminal configuration in which the components operate independently even though they are integrated

_______ 5. a system, most often external, that is accessed through telephone lines to allow office terminals to hook into a computer located elsewhere

_______ 6. a text-editing feature that allows the operator to scan a document horizontally, vertically, or by the page

_______ 7. a text-editing feature that adds space within the line of type to form a straight rather than a ragged right margin

_______ 8. another name for an element

_______ 9. printing that moves from left to right and then right to left

_______ 10. rapidly replacing the magnetic card as the common storage medium

a. bidirectional
b. floppy disk or diskette
c. distributed-logic system
d. font
e. justification
f. output
g. scrolling
h. shared-logic system
i. stand-alone
j. time-shared service

SUGGESTED ACTIVITIES

a. Obtain brochures on text editors from five different vendors and compare the features, printing devices, storage media, and price range.
b. Invite a vendor to class to demonstrate the features of a text editor.
c. Visit a word processing center and view text editors in use.

14

COMMUNICATION SYSTEMS, OCR, GRAPHICS, AND FACSIMILE

Objectives

After completing this chapter, you will be able to:

1. Define integrated systems and communications.
2. List four ways in which system integration can take place.
3. Define optical character recognition (OCR).
4. Discuss the benefits of using OCR.
5. Define computer graphics.
6. List some major applications for computer graphics.
7. Describe facsimile transmission.
8. List five advantages of facsimile transmission.
9. Discuss the present limitations of facsimile equipment.
10. Give several applications of facsimile equipment.

Many imaging devices have become available within the last few years to streamline the work flow in the automated office. These imaging devices fall under the general category of copy processing and reprographics equipment, since paper copies are their principal product.

Even though stand-alone equipment is presently leading in sales, the trend in office automation is toward an *integrated system*. In an integrated office, *communications* is the key to linking a variety of imaging devices together (see Figure 14-1).

COMMUNICATION SYSTEMS

Media incompatability—the fact that one type of magnetic media may not work on a different word processor or computer—has become a major problem within the information processing industry. New equipment with additional features is continually appearing, but most new equipment requires a new storage or communication medium. One word processor, for example, may not be compatible with another word processor; consequently, documents created on one machine cannot be edited, printed, or even read on the other. The ability to link text-editing machines to similar devices or to large computers greatly expands their capabilities. Some manufacturers are now offering hardware or software options that enable their products to communicate (or *interface*) with each other or with dissimilar equipment made by other manufacturers. This communication is one form of *media conversion.*

Word processors may also communicate with large computers, phototypesetters, and intelligent copiers and printers. Information contained on mi-

Wang.

Figure 14-1 Integrated system.

croforms and paper can also be transmitted across long distances through telecommunications. Several methods of communication are now possible for equipment and storage media that are not compatible.

Networks

Many organizations are implementing local-area networks that help them to integrate their automated office equipment. These networks electronically link all machines within a certain geographic area for more efficient equipment use and database management. The local-area network is generally linked by a coaxial cable (such as that used for cable television). A number of electronic components, including computers, text-editing machines, terminals, electronic storage devices, and printers, can be connected.

Local networks can be expanded to provide nationwide or even worldwide communications through large publicly and privately owned telecommunications switching networks which use combinations of land lines, microwave transmission facilities, and satellites to send messages anywhere.

Modem

A *modem* converts the *digital* (or "on-off") signal from a computer or word processor into an *analog* signal, such as an amount of current or a particular sound frequency. An *acoustic coupler* modem is a kind of cradle that holds a telephone receiver. A *direct-coupled* modem plugs directly from the computer into a wall telephone jack. A modem is needed for both the sending device and the receiving device. The modem converts the signals and sends them over regular telephone lines, and then reconverts the signal at the other end.

Optical Character Recognition

An optical character reader (OCR) can be used for media conversion by reading a hard copy printed by one type of equipment into the scanner for processing by different equipment. The OCR is discussed in depth below in this chapter.

Black Box

Interface vendors may supply the link between printing and editing systems in the form of a "black box," which converts the coding used by the text

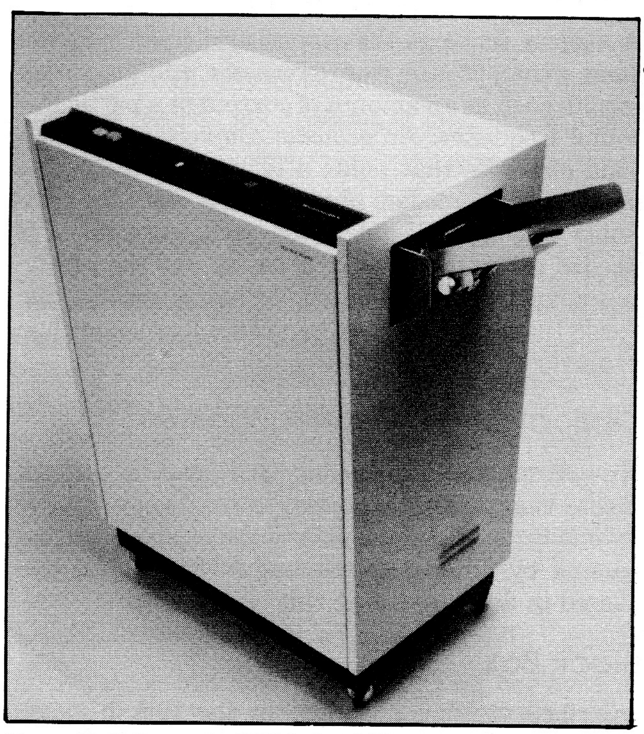
editor to the coding recognized by a phototypesetter, for example.

OPTICAL CHARACTER RECOGNITION (OCR)

Optical character recognition units are not new. The technology has been in use for about 25 years within the data processing industry. It has been used for reading checks, credit card statements, bills, prices on supermarket items, and magazine labels. However, its high price has limited the use of such equipment in the office. Technological advancements in the last few years, notably the semiconductor revolution and the reduction in price of memories and processing power, have made it possible to offer OCR products more in line with modest office budgets.

OCR Operation

An OCR unit uses a photoelectric sensor to quickly read (or *scan*) text material fed into it (see Figure 14-2). The copy is converted to digital form, which is then transferred to the memory of a text editor, computer, or phototypesetter. OCR machines are very accurate and make fewer than 1 error per 10,000 characters read.



Burroughs.

Figure 14-2 Burroughs 1200 Series OCR page reader.

The ability of an OCR unit to scan a document is based on a number of different techniques. The two most widely used methods, either individually or in combination, are matrix correlation and grid recognition.

Matrix correlation matches the digitized type to the digitized master font that is preprogrammed into the unit. Although matrix correlation is font-dependent, it can be used in both one-font and multi-font machines.

Grid recognition, or *feature extraction,* is also font-dependent, but recognizes individual characters regardless of font, as long as the basic characteristics of the typeface are in the system.

OCR Copy Requirements

Until recently, an OCR page reader could only scan material that had been typed in special typewriter fonts, called OCR-A and OCR-B. Manufacturers are now developing page readers that accept more common fonts, such as the Courier and Prestige Elite typefaces. The ability to recognize any typeface and merge text with graphics will become available later in the 1980s. Continuing advances in recognition technology point the way toward the availability of omni-font OCR machines.

Omni-font OCR equipment uses a pattern-recognition scanning technology, which gives the unit the ability to scan virtually any and all documents, regardless of typeface or font. One company (Kurzweil Computer Products, a subsidiary of Xerox) has an omni-font machine available (Figure 14-3). It reads any typed or printed material and can accommodate bound volumes. However, the machine is dependent on an operator "teaching" the machine each new font as it is introduced into the system. This half-hour procedure makes it impractical to use for any job less than ten pages long. In addition, the equipment is still extremely expensive.

Features of OCR

Features presently available on many OCR units include:

1. Multi-font recognition ability
2. High speed
3. The ability to read single-spaced text
4. Recognition of paragraphs, tabs, and underlining
5. The ability to read typewritten insertions
6. The ability to handle wrinkled, dog-eared, and smudged copy

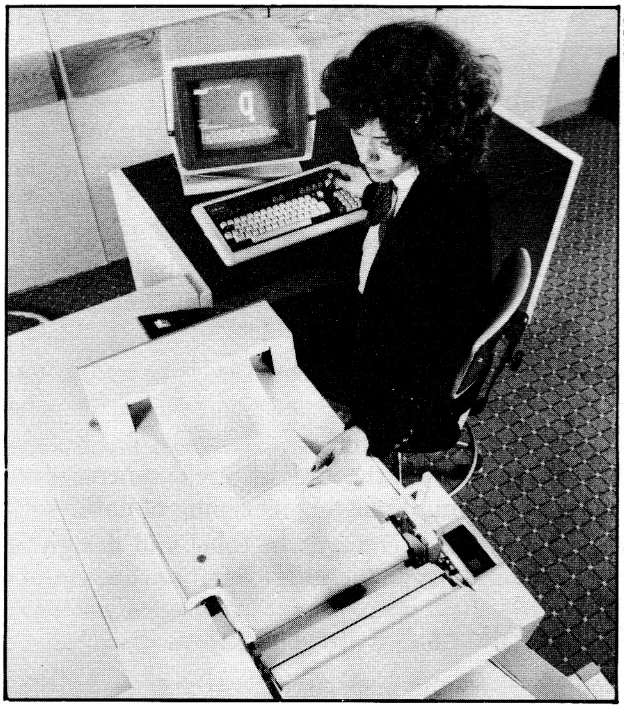
7. The capability of interfacing with existing office systems.

Benefits of OCR

An OCR can turn every typewriter in a company into a text editor. Production bottlenecks can be eliminated by producing documents on a standand typewriter. These documents can then be scanned into a text editor, allowing the text editor to be used only for editing, rather than inputting. This technique not only reduces cost by eliminating the need for many text editors, but also reduces the number of highly trained word processing operators.

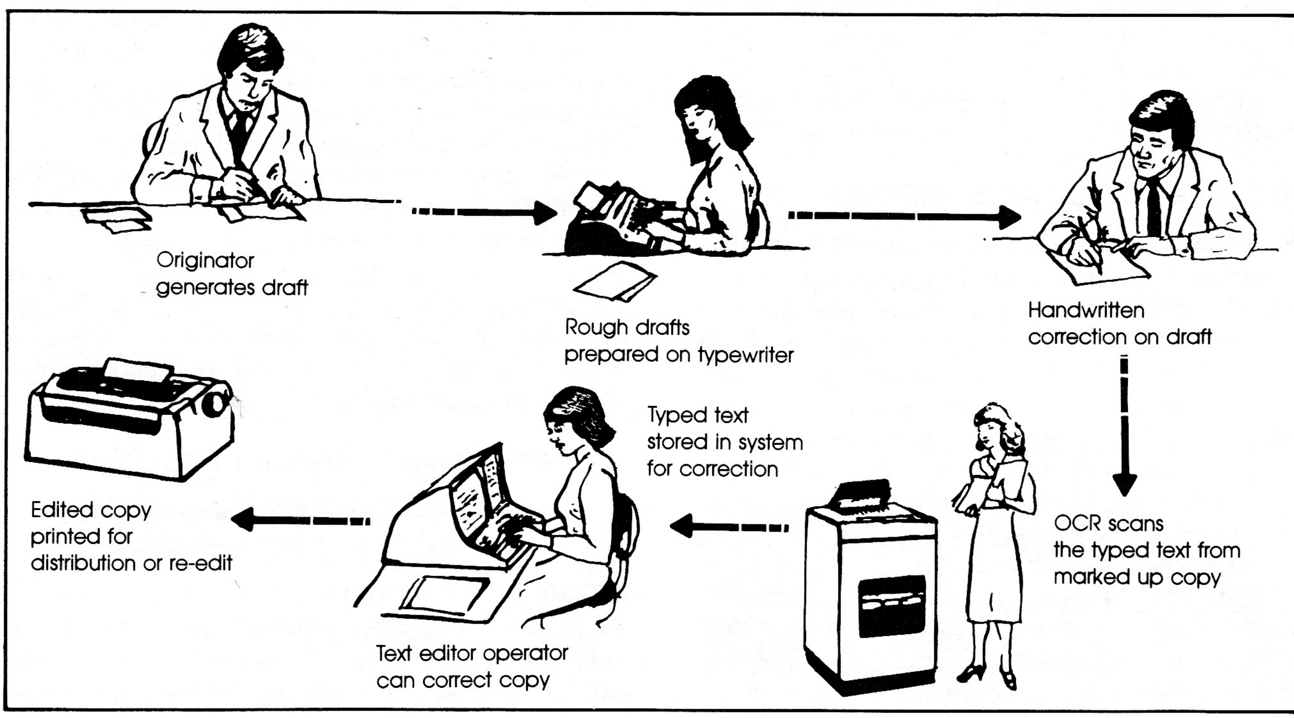
Specific benefits are the following:

1. The average person keyboards at 60 wpm (words per minute) or 6 cps (characters per second); OCR reads 200 cps or 1,930 wpm.
2. OCR converts 30 typewritten draft pages into magnetic media in 10 minutes, saving nearly a full day of input.
3. Increased production is directly proportional to the amount of time spent inputting rather than editing.
4. Accuracy is increased because there are fewer errors commonly associated with rekeyboarding.



Kurzweil.

Figure 14–3 Kurzweil Data Entry omni-font reader.



Hendrix.

Figure 14–4 A word processing system based on optical character recognition.

5. On-line OCR interfaces with background word processing systems.

An additional advantage of this system is that the traditional manager-secretary relationship does not have to be disrupted. Since much of the keyboarding will be done by secretaries more familiar with the originator's terminology, dictation style, handwriting, and spelling than operators would be, they can produce the rough draft faster and more accurately.

Economy is a major advantage of using an OCR scanner. One major saving is in time-consuming proofreading. Scanned documents need not be proofread with each keyboarding.

COMPUTER GRAPHICS

A picture, it is said, is worth a thousand words. Developments in computer graphics are proving the truth of this adage, as computers convert raw data into dynamic visuals that are easy to access and understand. Since the human mind remembers approximately 80 percent of what is derived from visual stimuli, perhaps the proverb should be revised to "A picture is often worth 10,000 words—and sometimes more."

Managers have always used graphics or charts as an aid in decision making. Using computers instead of artists to prepare graphic material is a trend growing some 60 to 70 percent a year. Two reasons for this growth are the drop in prices and the introduction of flexible computer graphics software, making it possible for persons with no computer training to produce computer-generated graphics without the aid of a programmer.

Computer Graphics Equipment

The equipment used to produce computer graphics resembles standard text-editing equipment. It consists of a CRT screen, a keyboard, and either a floppy or hard-disk-drive memory system. However, the terminal needed to convert digitized data into graphics requires a display generator. Three types of display generators available are *raster scan graphics, raster scan alphanumerics,* and *random scan.* The internal structure of a display generator can range from a single digital-to-analog converter to a microprocessor.

A graphics display terminal accepts information from an electronic keyboard similar to a text editor, but it can also accept input signals from such devices as a data tablet, a touchpanel, a light pen, a joystick, a trackball, or buttons. Images appear as a series of points, characters, or lines that make up a pattern (Figure 14-5).

Advantages of Computer Graphics

Among the advantages of using computer graphics in developing graphs, charts, or maps for business are:

1. Making information more visible to managers who have limited time to review printouts.
2. Developing charts from data already in the computer, at a lower cost than when they are produced manually.
3. Creating charts from data not already in the computer, when the cost of production is lower than that of manual production.
4. Improving the quality of a graphic presentation.
5. Increasing the rate at which data can be absorbed.
6. Reducing errors that might have occurred during the manual plotting or typing of data.
7. Making easier changes in color and design of charts and graphs.

Applications

Computer graphis can significantly improve productivity, if time and money are invested to get the system under way.

Managerial decision making can use computer graphics for financial analysis, monitoring, marketing or operations, or project control. Even at the lowest management levels, computer maps can effectively aid in planning, scheduling, and routing sales calls, service responses, and deliveries.

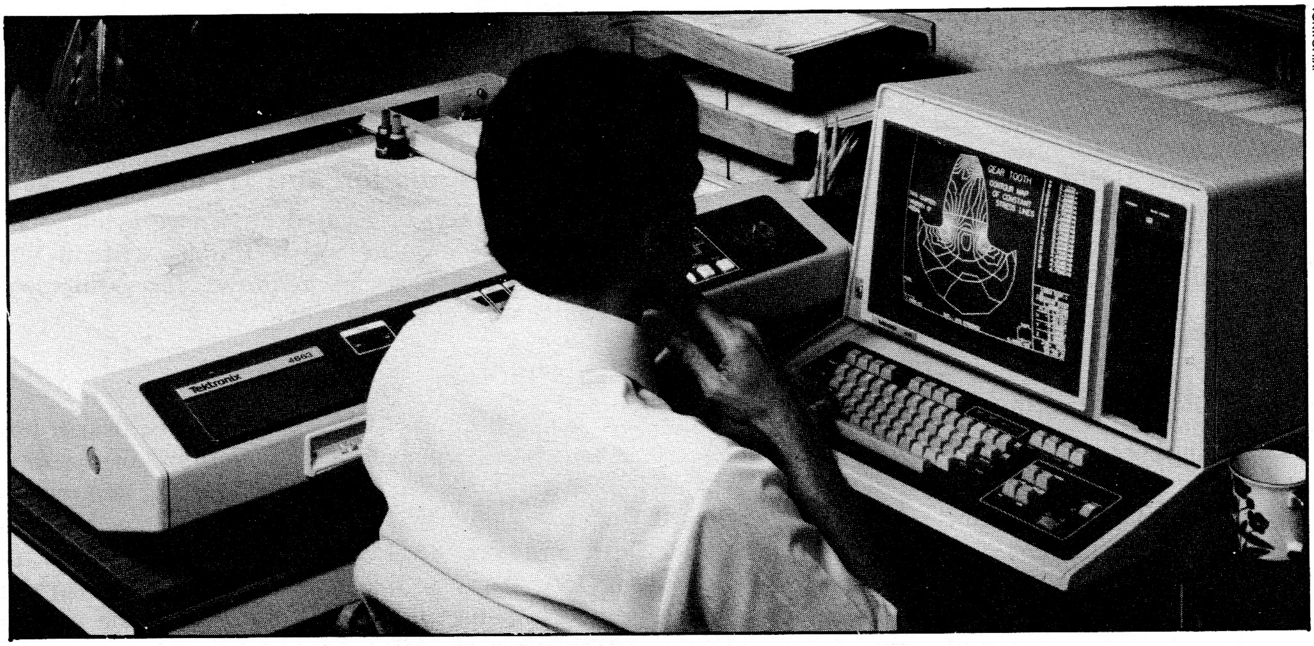
Training and boardroom presentations can also benefit from computer graphics. Material can easily be edited and updated by the computer to prepare and display training materials. Complex technical data may be communicated to federal agencies for regulatory compliance, throughout a corporation for review and decision making, or to outside professionals for consultation.

Implementing Computer Graphics

A company wanting to implement computer graphics may take one of four approaches.

Stand-Alone Devices

Stand-alone computer graphic devices are available in a range of prices. Low-cost microcomputers can do applications requiring low resolution. Because approximately 50 percent of the cost is in



Tektronix.

Figure 14-5 Tektronix 4112 computer graphics display terminal.

hardware and the other 50 percent in software, caution should be taken to be sure the desired software is available before a purchase is made.

Service Bureau Timesharing

In the timesharing system, the user makes a small investment in hardware, such as a plotter or color CRT, then relies on a timesharing firm for all software needs. Such service bureaus are growing in number in most major cities.

Minicomputers

The power of minicomputers has grown so significantly in recent years that the best available graphics software can now be run on many of them.

Mainframe

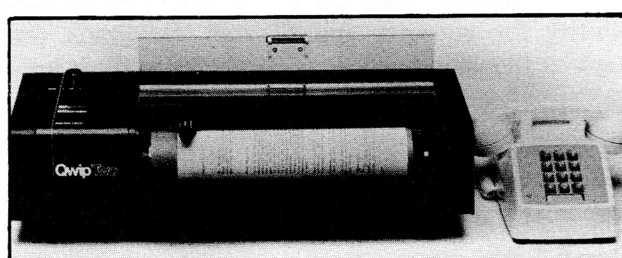
Computer graphics software may be installed on the company's mainframe computer, and computer graphics terminals distributed to users wherever they are needed. A central computer graphics facility may have the means for making color slides of these graphics.

FACSIMILE TRANSMISSION

A facsimile reproduction is an exact copy of the original. Of course, all photocopying falls into this category; however, the term *facsimile copying* (also known as FAX) refers to the process of reproducing copy transmitted electronically over a distance. Copies are sent over telephone wires by breaking up a document into thousands or millions of tiny dots that are transmitted as electrical signals (Figure 14-6).

A facsimile machine is actually an optical scanning device combined with a printer. It has an electronic eye which scans any written or drawn material. What it "sees" is instantly transmitted, dot by dot and line by line, to a matching unit at the other end of the phone line. There the image is picked up and printed, dot by dot and line by line. The result is an exact duplicate of the original document. Thus copies can be made quickly and accurately with all of the varying shades and tonal values of the original. The ability to transmit photographs, charts, and signatures as well as text data sets the facsimile process apart from other forms of electronic mail.

Facsimile copying has actually existed in some form since the 1840s, when Samuel Morse invented



Exxon.

Figure 14-6 Exxon Qwip Two desk facsimile unit.

the telegraph and Alexander Bain discovered a technique for sending visible signals over telegraph lines. Stewart Warner and Western Union introduced facsimile machinery in the late 1950s and early 1960s, but inadequate transmission facilities and high costs hampered its full-scale use. However, the last few years have brought about a greatly renewed interest in communications via electrical impulse generation as a way of getting material to its proper destination in the shortest period of time.

Facsimile Transmission Equipment

The facsimile equipment in use today falls into two categories: analog and digital.

In the most *analog* systems, a transceiver scans a document line by line at a constant speed, reading white space as well as images, converting everything on a page to electronic signals.

Digital systems operate on roughly the same principle, but in the interest of speed they "read" for black images only, eliminating the white spaces, and then code the information by means of a data-compression technique.

Digital systems transmit a typical 250-word business letter in 20 seconds, whereas analog systems require 4 to 6 minutes to send a single page. Medium-speed analog units are the most popular; however, despite recent technological advances in high-speed facsimile. Since transmission costs for high-speed facsimile are far higher than those of communicating word processors, the word processor will absorb most of the market for textual material. For image transmission, however, high-speed facsimile has no competition.

Advantages

Speed is obviously the main advantage of facsimile transmission. However, facsimile machines offer additional advantages.

Accuracy

An exact copy of the original is sent and received with no reformatting necessary. There is no possibility for operator input error. Originals are kept by the sender, so there is no risk of their loss.

Flexibility

Anything that is typed, handwritten, printed, or drawn can be sent and received by facsimile transmission.

Confidentiality

No third party is involved at either end of the transmission, or in between.

Portability

Portable facsimile units are available that can be put into a suitcase and carried home or on a business trip.

Simple Installation and Training

A machine can be located anywhere a telephone and electrical outlet are available, without any special user training required for equipment operation.

Limitations

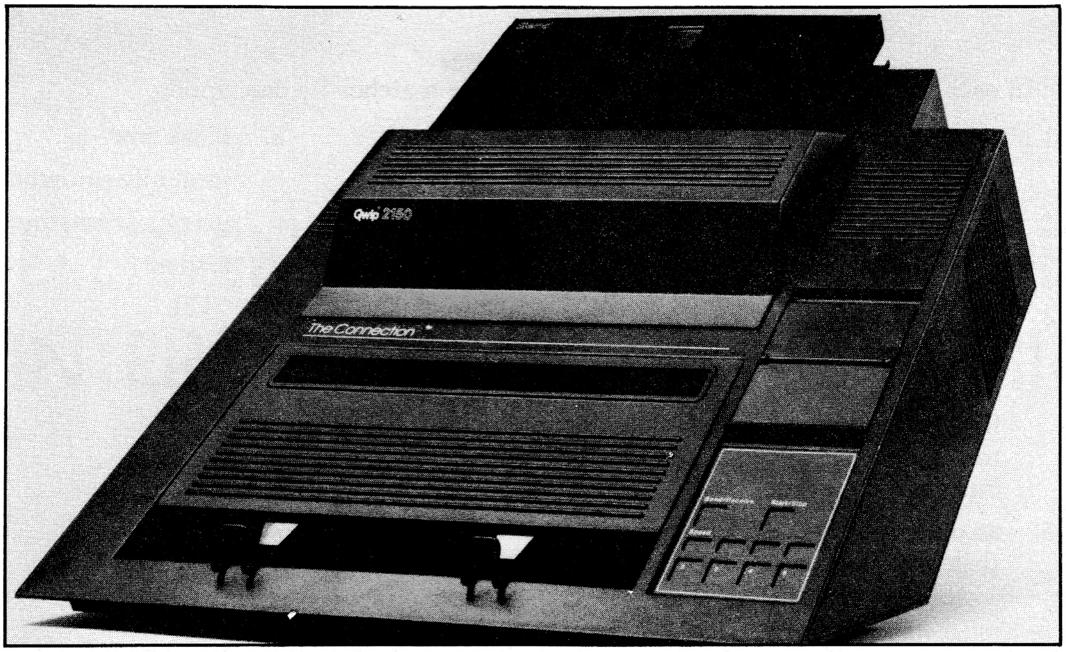
A major limitation of facsimile transmission has been the incompatibility of one brand of machine with another. In addition, transmitting and receiving machines must be set at the same speed of data transmission. Facsimile service bureaus can alleviate these problems. Subscribers to a service merely transmit their messages, and the service determines the type of machine receiving and the speed at which it receives. Then the bureau translates the message into the format required for the receiving machine.

Applications

Business applications for facsimile are varied. A typical application might be for a sales representative who wants to get a customer's order from the west coast to the home office on the east coast before a price change. Verification of the order and the customer's signature are needed, rather than just a verbal order; facsimile transmission makes both these possible.

It is predicted that facsimile will be the leading form of electronic mail in the 1990s and will hold third place in the communications field behind the telephone and first-class mail (Figure 14-7). The market for facsimile systems in 1980 was $800 million. Facsimile is expected to emerge over the next five years, resulting in a United States market of 835,000 installed units by 1985. This amount would be a growth rate of over 27 percent, effectively tripling the market.

Aside from the business applications, a major use of facsimile is in the field of *telephotography*—the transmission of newspictures. Weather maps are also transmitted to ships at sea and to forecast centers all over the United States from the National Weather Service, the National and Aviation Meteorological Network, and the Forecast Office Network, from which forecasts are prepared for the various news media, airports, and oceangoing vessels.



Exxon.

Figure 14–7 Exxon Qwip 2150 facsimile unit.

REVIEW QUESTIONS

True / False

Directions: Write a "T" in the blank if the statement is true, and an "F" if the statement is false.

_______ 1. Most word processors are compatible with a wide variety of equipment.

_______ 2. Networking is the wave of the future in information management.

_______ 3. OCR equipment has been used for a number of years in data processing.

_______ 4. OCR scanners are only capable of reading material that has been typed with either an OCR-A or OCR-B font.

_______ 5. An OCR can turn every typewriter in a company into a text editor.

_______ 6. Today it is possible for a person with no computer training to produce computer-generated graphics without the aid of a programmer.

_______ 7. A company wanting to implement computer graphics is limited to stand-alone graphic devices or service bureau timesharing systems.

_______ 8. A facsimile is an exact copy of an original.

_______ 9. Facsimile capabilities have existed since the 1800s.

_______ 10. One disadvantage of facsimile transmission is that the copies must often be reformatted after they are received.

Matching

Directions: In each blank, write the letter of the term that matches its description.

_______ 1. a communications device that holds a telephone receiver

_______ 2. a device that connects the coding used by a text-editor machine to the coding recognized by a phototypesetter

_______ 3. used for media conversion from hard copy to the type of media required by different equipment

_______ 4. a type of equipment that can accept input signals from numerous devices including a data tablet, a touch panel, a light pen, a joystick, a trackball, or buttons

_______ 5. an optical scanning device combined with a printer that transmits information via the phone line

a. black box
b. facsimile equipment
c. graphics computer
d. modem
e. OCR

SUGGESTED ACTIVITIES

a. Read and report on three magazine articles on one of the following topics:
   Communication Systems
   Computer Graphics
   OCR
   Facsimile
b. Visit a computer store and ask for a demonstration of computer graphics software.
c. View a film made for IBM entitled "Pushing the Limit." The film is distributed by
   Modern Talking Pictures Service
   1145 N. McCadden Place
   Los Angeles, CA 90038
   (Phone 213/469-8282)

15

INTELLIGENT COPIERS, INTELLIGENT PRINTERS, AND MICROGRAPHICS

Objectives

After completing this chapter, you will be able to:

1. List the capabilities and advantages of intelligent copiers.
2. Identify the differences between intelligent copiers and intelligent printers.
3. Define micrographics.
4. Name and describe the four types of microforms.
5. Name and describe the three types of computerized micrographics.
6. Name the five advantages of micrographics.
7. List some disadvantages of micrographics.

Intelligent copiers, intelligent printers, and micrographics are classified as imaging devices because all of them are capable of producing hard copies. Intelligent copiers and printers are a relatively new development. Micrographics, a method of miniaturizing records on film, is not new, but it has been affected by recent technological advances.

INTELLIGENT COPIERS AND PRINTERS

The newest imaging machines in the office automation field are the intelligent copiers and printers, or IC/Ps. These devices combine the technologies of printers, facsimile and other communications devices, and copiers.

Intelligent Copiers

Intelligent copying, although still in its infancy, is growing rapidly. The function of the intelligent copier can be broken down into four elements: input, data storage, imaging, and output. Three elements (input, imaging, and output) are no different from those offered by conventional copiers. What sets the intelligent copier apart from the conventional copier is not only its storage capability but also its wide flexibility of input and output.

Operation

Intelligent copiers are devices that can print from digitized data as well as from hard-copy original material. Information can therefore be sent from word processors and computer storage to intelligent copiers without ever putting it on paper. Furthermore, these hybrid systems allow information to be arranged in a variety of formats and printed in a variety of type styles (Figure 15-1).

To be intelligent, a copier needs to have a significant amount of buffer memory. *Buffer memory* is a temporary storage unit that accepts one type of input and delivers it in another form. The ability to input electronic signals and output hard copy, receive information from other devices in a communications network, and format output (in both type fonts and layout) makes these devices true

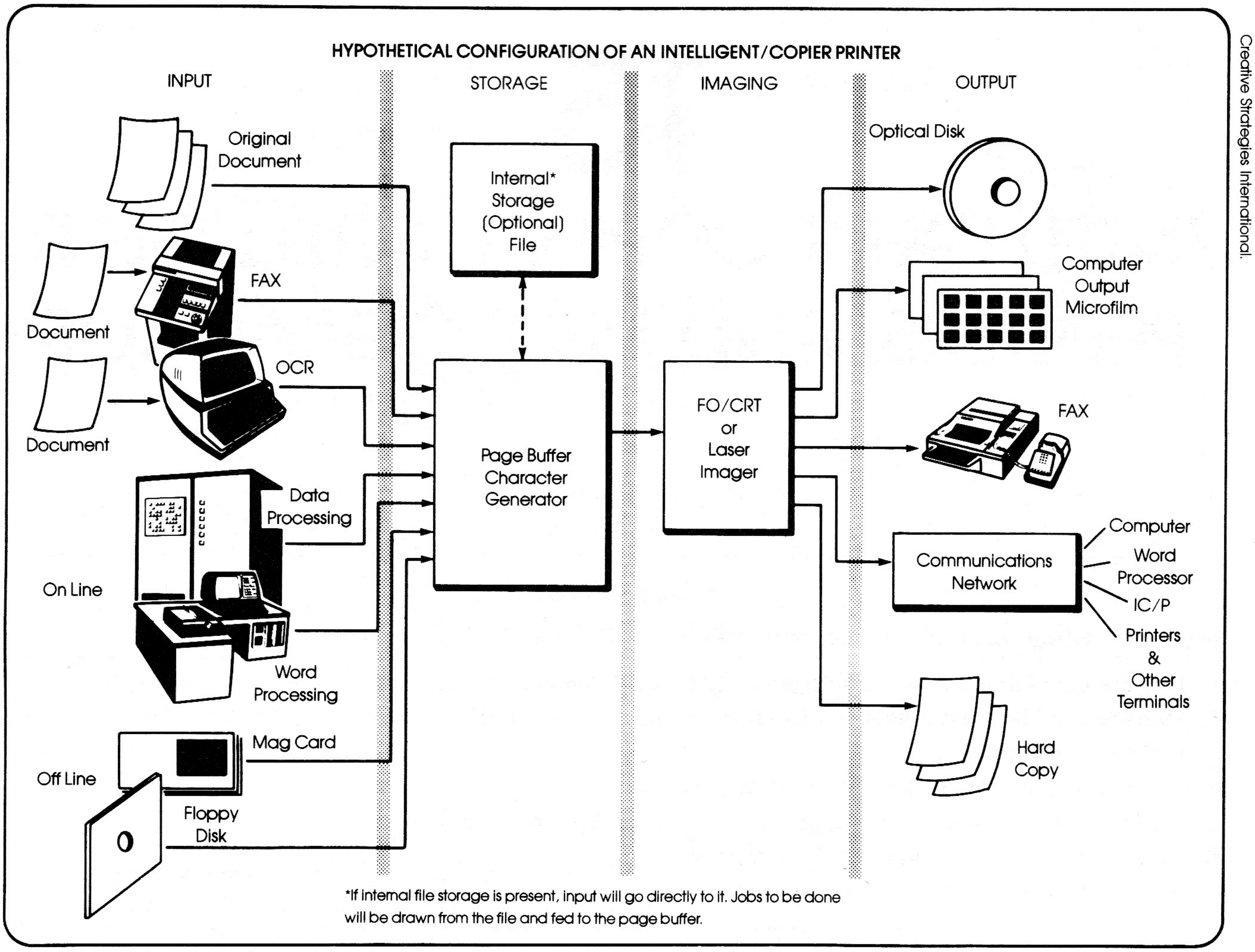


Figure 15–1

information processors and distributors. Most units provide two-sided printing on plain paper with high resolution, utilizing lasers and fiber optics.

Advantages

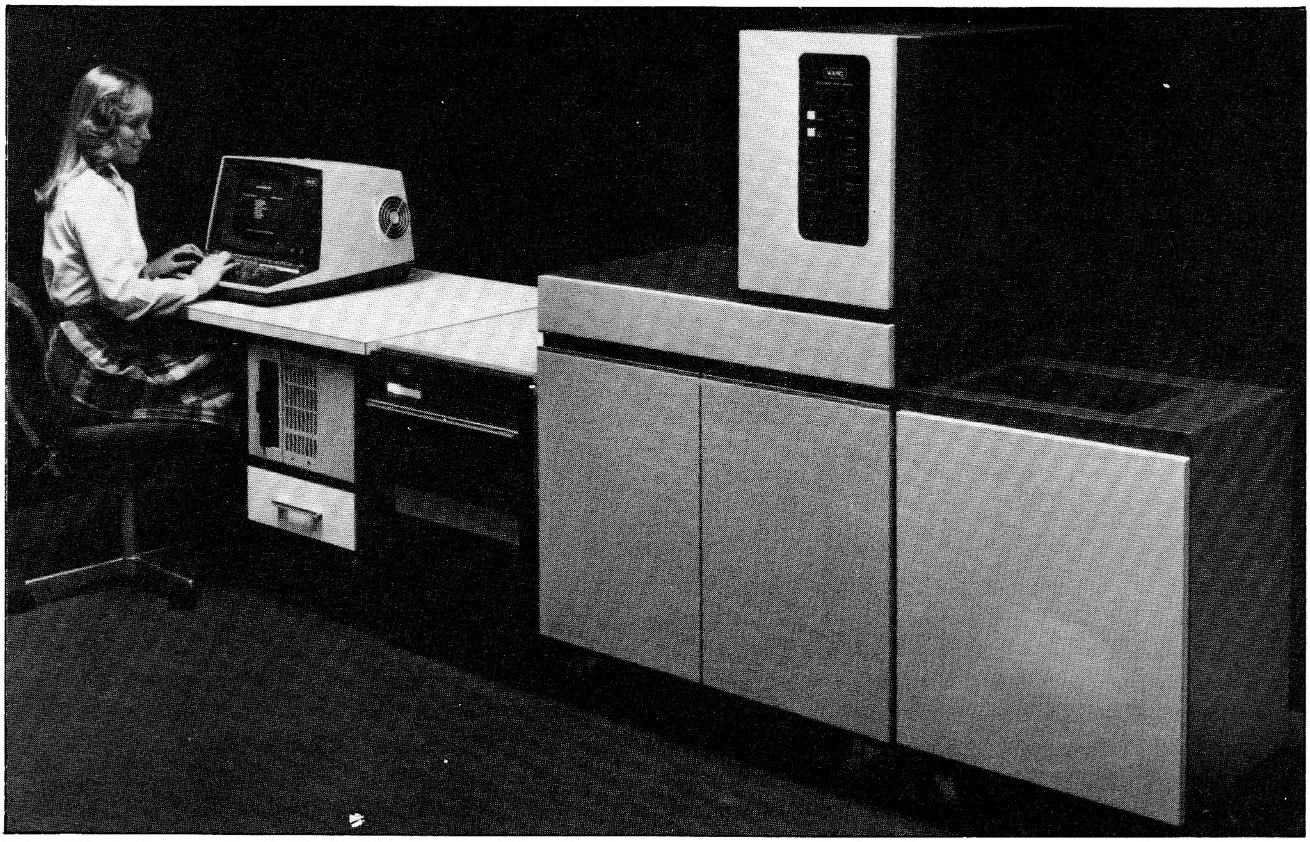
Intelligent copiers, available in a variety of sizes and prices, provide major advances in versatility, convenience, and savings in labor. As hybrid machines, intelligent copiers combine a number of different technologies to eliminate some of the time-consuming and expensive intermediate steps in the preparation of originals for reproduction.

Intelligent copiers are well suited to word processing, data processing, and central reproduction departments. Their ability to print graphics, logos, and signatures is a bonus that is not available with today's word processors.

Capabilities

The potential of these advanced machines in the office seems virtually unlimited at this time. With various options, equipment combinations, and interfaces, an intelligent copier can:

1. Assemble, print, collate, staple, address, and distribute documents automatically on demand.
2. Customize and print forms and data for individual applications.
3. Archive data on a variety of media, including magnetic tape, disks, and microfiche, directly from IC/P.
4. Communicate between intelligent copiers and printers and text editing or data processing equipment, facsimile units, and other IC/Ps from across the room or across the continent.
5. Allow unattended mail or facsimile transmission, reception, or printing.
6. Typeset and duplicate reports originating from electronic typewriters, graphics, terminals, CRTs, and executive work stations.



Wang.

Figure 15–2 Wang's intelligent image printer.

7. Reprint old reports from magnetic cards or floppy disks.
8. Portray any alphabet, logo, or graphic representation of information.
9. Operate at a very low noise level.
10. Condense text to fit a smaller page size.
11. Print at speeds of from 10 to 120 pages per minute.

Intelligent Printers

Closely related to the IC/Ps are the nonimpact high-speed printers in the word processing and data processing environment (Figure 15-2).

Intelligent printers are unable to accept hard-copy text or graphic images as do intelligent copiers, but they offer higher speed than do standard impact-type printers. The printer system may combine computer, laser, and xerographic technologies to print data, textual material, and forms, in almost any size or shape, directly from digital information. Electronic input can come from small business computers, remote terminals of large computing systems, word processing systems, and advanced electronic mail systems. (See Figure 15-3.)

The number of brand and generic names adds to the confusion surrounding the intelligent printer. It may also be called a *beam printer, document production system, information distributor, image printer,* or *electronic printing system.*

MICROGRAPHICS

Micrographics is the method of filing information on film using miniaturized images. It eliminates the need for storing bulky paperwork.

History

One of the first uses of microfilm occurred in 1870 during the Franco-Prussian War, when carrier pigeons were used to deliver photographically reduced strips of intelligence reports. Twenty strips containing approximately 75,000 words each were fastened to the pigeons. Over two million microfilmed images were flown over the battlelines.

By 1920, the filming of checks had begun. This led to the uses of microfilm in other areas. During

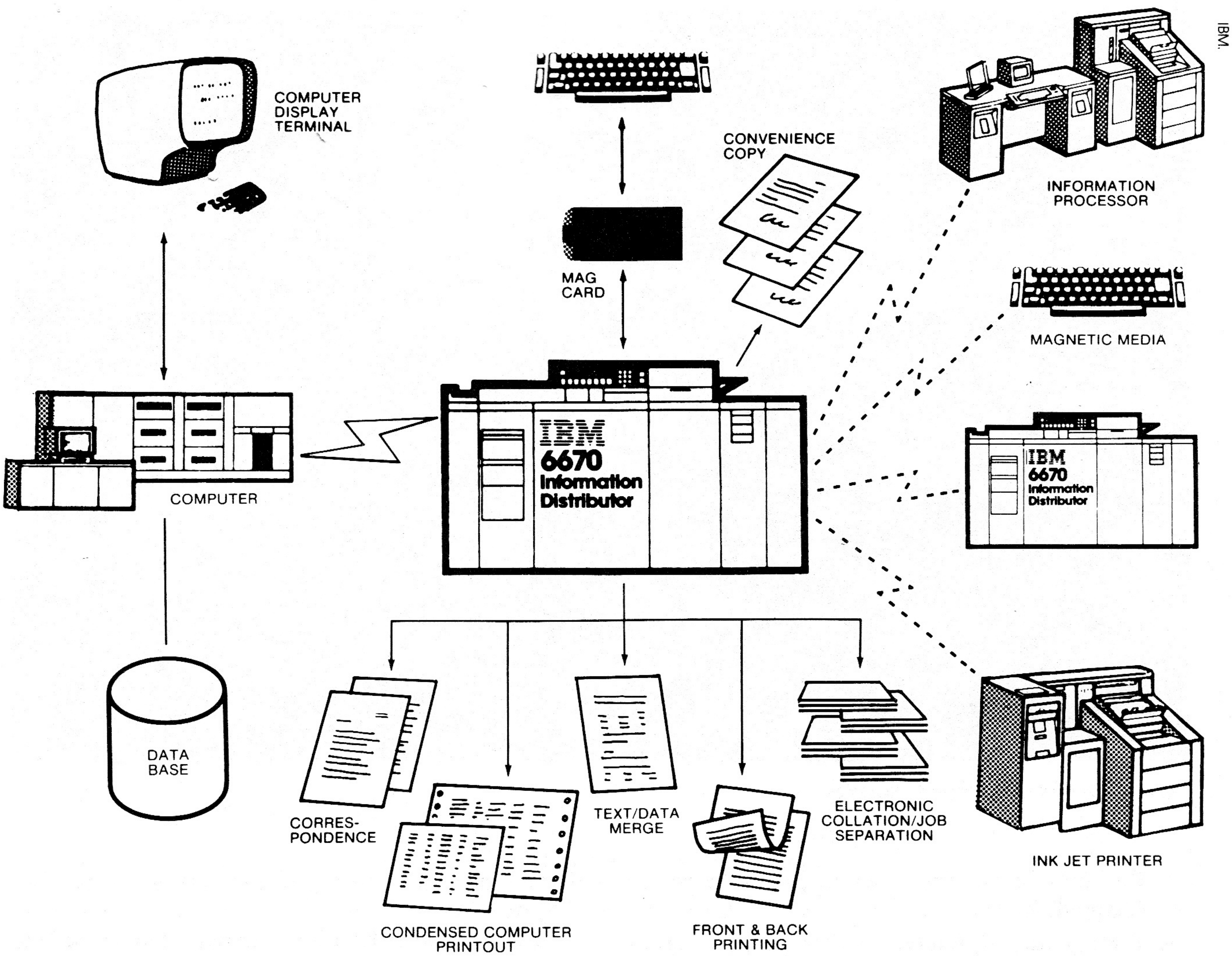


Figure 15–3 IBM 6670 Information Distributor.

World War II, "V-Mail" introduced microfilm to the general public. Almost two billion letters were filmed and flown overseas, where hardcopy prints were produced and delivered. In 1967, federal legislation permitted the legal acceptance of filmed, rather than paper, documents.

The computer brought the most significant developments in microfilm. By combining microfilm recording, storage, and retrieval capabilities with computer indexing and control, a high-speed, economical information dissemination system became available.

The importance of such a system becomes clear when we consider that each of the 18 million white-color workers in the United States maintains about eight file drawers of information containing some 18,000 documents. The total of 324 million file cabinets is increasing at the rate of some 4,000 documents, or nearly two file drawers, per employee per year. Micrographics can save approximately 95 to 98 percent of the space needed for storing these records.

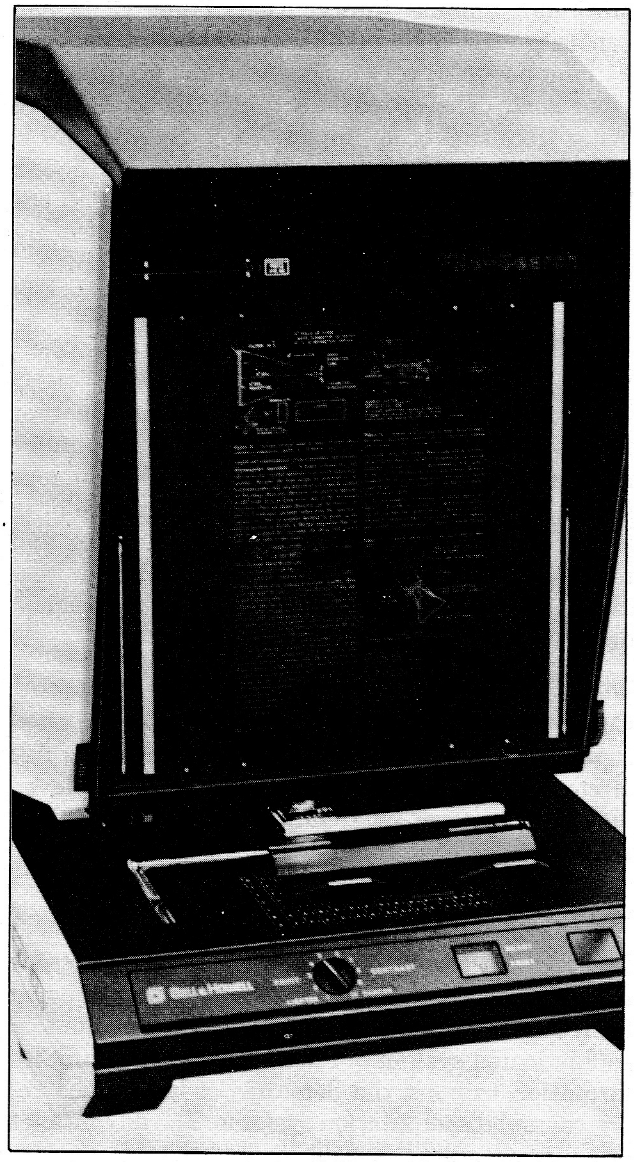
Operation

A camera is used to film existing documents in miniature. The film is then processed, duplicated, and stored. When needed, it can be retrieved manually, mechanically, or electronically with index aids, depending on the size of the system and the retrieval needs. The document can be read or printed on a reader or reader-printer (Figure 15-4).

Microimages can be stored on four different kinds of microform: microfilm, aperture card, microfilm jacket, and microfiche (See Figure 15-5).

Roll Film

Roll film is 35 mm film housed on a reel, a cartridge, or cassette, suitable for large volumes of



Bell & Howell.

Figure 15–4 Bell & Howell File-Search Reader/Printer.

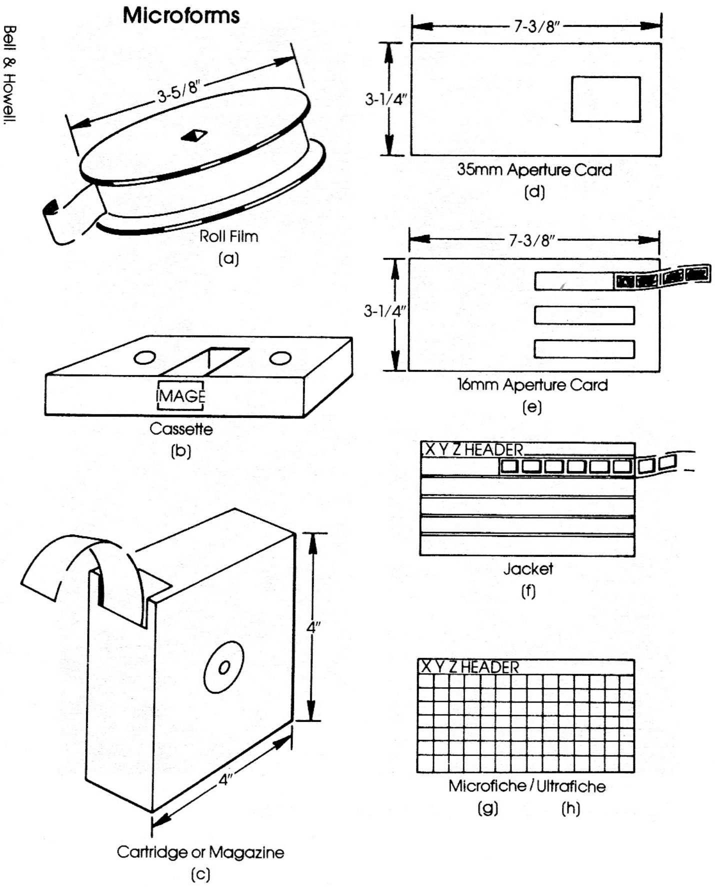


Figure 15–5 Types of microforms.

paperwork that can be numbered in sequence. This is the oldest and most economical type of microform. It is best suited for work that is not often consulted.

Aperture Card

An aperture card has an opening in which a strip or frame of microfilm is mounted. A single frame of film can be located, as in a paper document. Everything from letters to cumbersome engineering drawings can be reduced to aperture size. A writing area for indexing is provided on the card.

Microfilm Jacket

A microfilm jacket is a folder of clear material sealed on two sides. Within the folder are channels into which microfilm can be slipped from one open end. One microfilm jacket can store 60 to 70 documents. Updating of files is a simple task, since individual frames are easily inserted at any time.

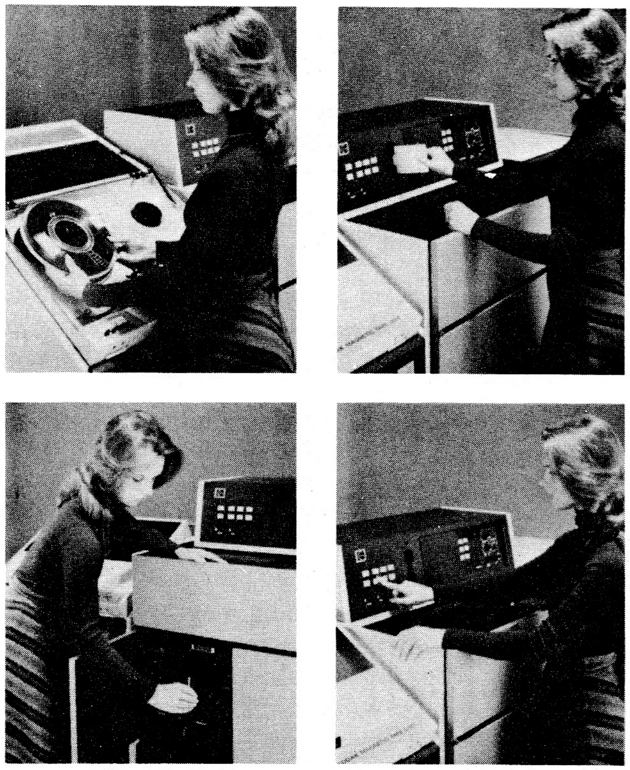
Microfiche

Microfiche is a sheet of stiff film containing several hundred exposures. Microfiche is commonly used for publications or reports that must be referenced frequently and distributed widely, such as catalogs. The best way of updating a microfiche is to discard one microfiche and replace it with another.

Ultrafiche, or *ultramicrofiche,* is a type of microfiche which permits extreme reduction of material. This format can reproduce 1,200 printed pages of the Bible on approximately 2 square inches of film.

Ultrastrip

Ultrastrip is a filmstrip 8 inches long, containing 5 segments. Each segment is partitioned into 2,000 images, and the entire strip contains 10,000 images of 8½- by 11-inch typewritten pages.



Eastman Kodak.

Figure 15–6 Eastman Kodak COM recorder.

Computerized Micrographics

Within the last decade, micrographics and electronic technology have experienced a dramatic union. Three types of interfacing between micrographics and computers have emerged on the business scene. They are known by their abbreviations: COM, CAR, and CIM.

Computer Output Micrographics (COM)

Computer output micrographics (COM) provides microforms directly from a computer without using paper (Figure 15-6). Information—data, text, or graphs—is stored in a computer in digitized form. When microform output is needed, the format is coded and run from the computer through the COM recorder to create a microform. The COM recorder is a substitute for the impact line printer or page printer that creates paper copies.

COM and conventional microfilming differ in that the image in COM is microfilmed from an electronic image, not from a paper original. The printout process is eliminated altogether. A COM recorder can microfilm the equivalent of 200 or more 11- by 14-inch pages of data per minute, with minimum manual intervention. Thus, COM can generate vast amounts of readable information without paper, at very fast speeds, and at minimum labor cost. (The speed is actually 10 to 20 times faster than that of an impact line printer.) COM is a major tool in the automated office. Although high-speed nonimpact page printers now rival the speed of COM, and on-line disk storage costs are competitive, COM is an efficient way to produce vast amounts of information economically and quickly.

Computer-Assisted Retrieval (CAR)

Computer-assisted retrieval (CAR) is another technology in which the advantages of computer and microfilm systems are combined. CAR employs a host computer to store address and profile data for randomly microfilmed records, documents, and information. With CAR, an operator has immediate, hands-on access to millions of microfilmed documents.

Computer-Input Micrographics (CIM)

Computer-input micrographics (CIM) is a developing technology that will bring micrographics full circle. Information in a computer can be retrieved onto a microform by COM, and then, as needed, read back into the computer by CIM.

Advantages

The applications of micrographics are as numerous as there are types of businesses. It has progressed from a simple method of recording documents to a sophisticated system of recording and indexing information to meet the demands of high-speed retrieval and dissemination systems. The advantages of a micrographics system include the following:

Speed

Information can be captured on microfilm in a fraction of a second. Under optimum conditions, thousands of documents per minute can be captured on microfilm.

Size

Microforms can store information in an extremely small space—much smaller than that of any other medium except electronics. One cartridge carousel, for example, can store 4 million documents. Standard reductions can save at least 95 percent of the space occupied by any paper system. This amount can be increased substantially by going to higher reductions, but this is seldom economically feasible.

Ease

Microforms have proven to be easy to use, both in indexing and in handling. Certainly, they are easier to handle than the paper they replaced. Microform indexing systems, which may appear complex at first glance, are convenient and simple to use after a brief training period. The microform image can be found automatically by machine, rather than visibly by hand. The index can also be set up like a telephone directory, from which the keyboard of an automatic retrieval device can retrieve a microfilm image in seconds.

Accessibility

Indexing of microforms is expanding to include author, recipient, date, and three or four key words that describe the document's subject. Instead of spending the national average of 20 percent of time looking for information in files, the modern professional may spend as little as 5 percent locating information, leaving 15 percent more time for completing regular tasks.

Cost

In addition to the cost saved by rapid access, microform duplication itself is very low in cost. A 100-foot roll of 16 mm film containing 2,300 pages can be duplicated at a cost of about $3. A duplicate aperture card might run 2 or 3 cents. Microfiche images are generally duplicated at less than one-tenth of a cent per image. Another cost savings of micrographics comes with the low-cost transmission of large amounts of information from one point to another.

Disadvantages

Micrographics does have a few disadvantages. First, some type of device is needed to read or make copies. Second, the retrieval time for obtaining single images is rather slow, although it is becoming more rapid. Third, microforms are nonerasable (for this reason, however, they are more admissable as evidence in court than are computer-generated documents). Finally, the initial cost of equipment is high, but it pays for itself within a short period of time.

REVIEW QUESTIONS

True/False

Directions: Write a "T" in the blank if the statement is true, and an "F" if the statement is false.

_______ 1. Intelligent copiers can print from digitized data as well as from hard-copy original material.

_______ 2. In addition to the functions of a conventional copier (input, imaging, and output), the intelligent copier also features data storage.

_______ 3. Intelligent printers are unable to accept hard copy.

_______ 4. Intelligent copiers were first used during World War II.

_______ 5. Micrographics is a relatively new concept, which first developed in the late 1960s.

_______ 6. Micrographics can save approximately 95 to 98 percent of the space needed for storing records.

_______ 7. Microfilm can store information in less space than any other medium.

_______ 8. The office worker can save as much as 15 percent of the time normally spent retrieving information by using micrographics.

_______ 9. Microfilm is not admissible as evidence in court.

_______ 10. The primary purpose of microfilm is to store hard copy as backup copy.

Multiple Choice

Directions: In the blanks, write the letter of the choice that best completes each statement.

______ 1. Intelligent printers are also called
   a. beam printers
   b. image printers
   c. information distributors
   d. all of the above

______ 2. A folder with channels into which microfilm can be inserted is called
   a. roll film
   b. aperture card
   c. microfilm jacket
   d. microfiche

______ 3. The integrated micrographic and computer system that microfilms from an electronic image and stores information in the computer is known as
   a. COM
   b. CAR
   c. CIM
   d. COR

______ 4. The integrated micrographics and computer system that employs a host computer to store address and profile data for randomly microfilmed records, documents, and information is
   a. COM
   b. CAR
   c. CIM
   d. COR

______ 5. The average white-collar worker in the United States maintains how many file drawers of information?
   a. one
   b. three
   c. five
   d. eight

SUGGESTED ACTIVITIES

a. Select two articles from business periodicals on intelligent copiers or printers, and prepare an oral or written report on recent developments.
b. Tour a records management center and report on your observations.
c. Secure examples of three different microforms.

Part V

DECISION-MAKING CONSIDERATIONS

16

SELECTION, PLACEMENT, AND CAUTIONS

Objectives

After completing this chapter, you will be able to:

1. Describe the purpose of a feasibility study.
2. Discuss the advantages of in-plant reproduction versus off-site reproduction.
3. Discuss four considerations in selecting equipment and systems vendors.
4. Name an unbiased reference for checking out vendors.
5. Name and discuss the three categories of equipment or system placement.
6. Discuss ways of cutting down on waste in using reproduction equipment.
7. Describe the legal restrictions on reproducing documents.

After a study of the various reproduction processes, imaging devices, and integrated systems currently on the market, a discussion of the ways in which to select the equipment is in order. There is no one best machine, process, or device. Situations, requirements, and economic factors vary. After the selection of a piece of equipment or a system, the next consideration is placement. The location of equipment can be essential to the smooth, economical running of a company. After the equipment has been selected and placed, certain cautionary measures should be considered if the equipment is to justify its expense.

SELECTION

Before a piece of equipment is purchased, many companies conduct a feasibility study to determine needs for and advantages of change. The feasibility study may also determine whether in-plant or off-site reproduction is better. If the feasibility study indicates in-plant reproduction is desirable, and if management agrees, the next step is finding a vendor.

The Feasibility Study

A feasibility study can determine which, if any, of the new technologies are needed in an organization (Figure 16-1). Management support is a prerequisite to any feasibility study. The study can explore the selector of equipment, the design of the office environment, the actual placement of new equipment, new office procedures, and new employee positions.

The feasibility study may include an analysis of present work loads, procedures, and duties. It may involve an opinion survey of the workers. The study may be conducted by persons within the organization or by outside consultants. Equipment vendors are always willing to help in a study. However, they normally do not reveal the inadequacies

Feasibility Study Checklist

1. What kind of copy is being produced now, where is it being produced, and how often is it produced?
2. Is the workload heavier at certain times than at others?
3. What are the production costs for paperwork now?
4. Which new standards and features on equipment would supply your needs?
5. Is the operator's time employed mainly in one-time typing, in revision, or in repetitive typing?
6. How much of the operator's time is spent typing?
7. How much of the operator's time is spent on revision typing? Is revision work necessary because of errors or interruptions? Who is accountable for revisions—the operator or the originator?
8. Which personnel originates the most work?
9. How long or complex is the copy to be processed? Would it be more beneficial to allow copy to be processed by off-site copy processing specialists than in-house?
10. Should the word processing system be linked to other systems? For example, if there is a present need to produce manuals or reports that will be keyboarded on information processing equipment a word processing unit linked to phototypesetting equipment allows greater efficiency by eliminating the rekeyboarding of material.
11. How much time is involved in the copy process? That is, the time required by the originator to generate copy, the keyboarding and the return of it to the originator? Should this amount of time be reduced?
12. Does your organization or company have special equipment needs? For example, if your organization produces technical manuals which include long statistical tables your organization may prefer equipment with the capability to do columnar movement, to provide an accuracy check of column numbers, and to do automatic alignment of decimal points.

Adapted from Marly Bergerud and Jean Gonzalez, *Word/Information Processing Concepts, Careers, Technology, and Applications,* published by John Wiley & Sons, Inc.

Figure 16–1

of their products and may not compare their costs with others' costs. An outside consultant can lend expertise and objectivity. Most consultants are very expensive, but their help may pay for itself within a few months or years. Consulting firms are available in many cities. When choosing a consultant, recommendations from other companies are highly desirable.

Company employees may also conduct the feasibility study. Since they already know the company's policies and needs, they can spend their time in visiting other companies, talking with vendors, attending seminars, reading current periodicals, and evaluating equipment. Many companies find it profitable to use employees along with a consultant. This combination reduces the amount of time the outside consultant is needed, and takes advantage of employees' expert knowledge.

In-Plant or Off-Site?

The feasibility study may show what equipment is needed, but a thorough study should also decide whether securing the equipment and staffing the office will be more beneficial than sending the

COPIER EVALUATION GUIDE

General Features

Copying Volume:	..........copies/month
No. Original Documents:	..........originals/month
Max. Document Size:	..........by..........
Max. Copy Size:	..........by..........
Preferred Paper Type:	( ) — coated ( ) — plain
Preferred Paper Form:	( ) — roll-fed ( ) — sheet-fed

Copying Costs (based on above volume)

Machine-Only Costs	
Per Copy:..........¢/copy	Total..........$/month
Service Costs (if extra)	
Per Copy:..........¢/copy	Total..........$/month
Paper & Toner Costs	
Per Copy:..........¢/copy	Total..........$/month
Other Expendables (developer, drum, etc., if extra)	
Per Copy:..........¢/copy	Total..........$/month
Total Copying Cost (sum of above)	
Per Copy:..........¢/copy	Total..........$/month

Field Evaluation Checklist

COPYING ABILITY	Excl	Good	Fair	Poor
Type/Printed Originals:	( )	( )	( )	( )
Photos and Halftones:	( )	( )	( )	( )
Solids:	( )	( )	( )	( )
Text on Solids:	( )	( )	( )	( )
Colors (in black):	( )	( )	( )	( )
COPY QUALITY	Excl	Good	Fair	Poor
Image Sharpness:	( )	( )	( )	( )
Uniformity Across Page:	( )	( )	( )	( )
Background Whiteness:	( )	( )	( )	( )
Smudge Resistance:	( )	( )	( )	( )
OPERATION	Excl	Good	Fair	Poor
Operator Controls:	( )	( )	( )	( )
Operator Indicators:	( )	( )	( )	( )
Ease of Loading Originals:	( )	( )	( )	( )
Ease of Loading Paper:	( )	( )	( )	( )
Ease of Loading Toner:	( )	( )	( )	( )
Ease of Clearing Jams:	( )	( )	( )	( )
Ease of Maintenance:	( )	( )	( )	( )
Noise Levels:	( )	( )	( )	( )
Fumes/Vapor Levels:	( )	( )	( )	( )
RELIABILITY	Rare	Infreqnt	Freqnt	Excessv
Paper Jams/Misfeeds:	( )	( )	( )	( )
Contrast Adjustments:	( )	( )	( )	( )
Damp/Singed Copies:	( )	( )	( )	( )
Toner Replacement:	( )	( )	( )	( )
Developer Replacement:	( )	( )	( )	( )
Drum/PC Replacement:	( )	( )	( )	( )
Machine Breakdowns:	( )	( )	( )	( )
VENDOR SERVICE	Excl	Good	Fair	Poor
Response to Service Call:	( )	( )	( )	( )
Quality of Service:	( )	( )	( )	( )
Promptness of Deliveries:	( )	( )	( )	( )

Figure 16–2

work off-site. For instance, large bills for outside copying and phototypesetting might be offset within a year or two by the savings of in-house equipment and staff. In-house equipment is also available for future projects at no additional cost. A checklist such as that in Figure 16-2 is valuable in choosing equipment for in-house use, in this case choosing a copier.

Authorities estimate, for example, that if a company is spending $15,000 a year on outside typesetting, an in-plant typesetting system can save 50 to 75 percent of the outside costs. In turn, the company would be able to typeset many other documents that it otherwise might not have. Figures 16-3 and 16-4 illustrate the compaction effect of typesetting and the resultant savings. A "Rule of 100," suggested by Bouscher Associates, helps determine when a document is a candidate for typesetting (Figure 16-5).

Choosing a Vendor

High-pressure sales talks and friendly salespeople may make it difficult to evaluate equipment objectively. The first thing to look for from a vendor is a competitive price. This is more complicated than it sounds; for example, a machine may cost more from one vendor than another, but its additional features or the vendor's service may make it the better buy. Hidden costs such as supplies must also be considered.

A second consideration is whether to rent, lease, or purchase equipment. Many methods of financing are available. When a new machine comes on the market that can perform specific operations faster or at lower cost, your present equipment becomes obsolete. For this reason, some companies prefer to rent or lease rather than buy. Others decide that if the equipment meets their present needs, they might as well purchase it outright. If they find they need new equipment, they can trade in or sell the old.

Vendors vary widely in the amount of training they offer on the new equipment. Marketing support representatives are provided by some vendors to give assistance. Other vendors may offer a week's training period for one or two persons, but charge for any additional help.

The service and maintenance offered by the vendor is usually a necessary expenditure. However, the vendor's reliability and the waiting period before equipment can be serviced are important factors. The quality of the service may vary from one region of the country to another; therefore, local users of a particular brand of equipment should always be contacted.

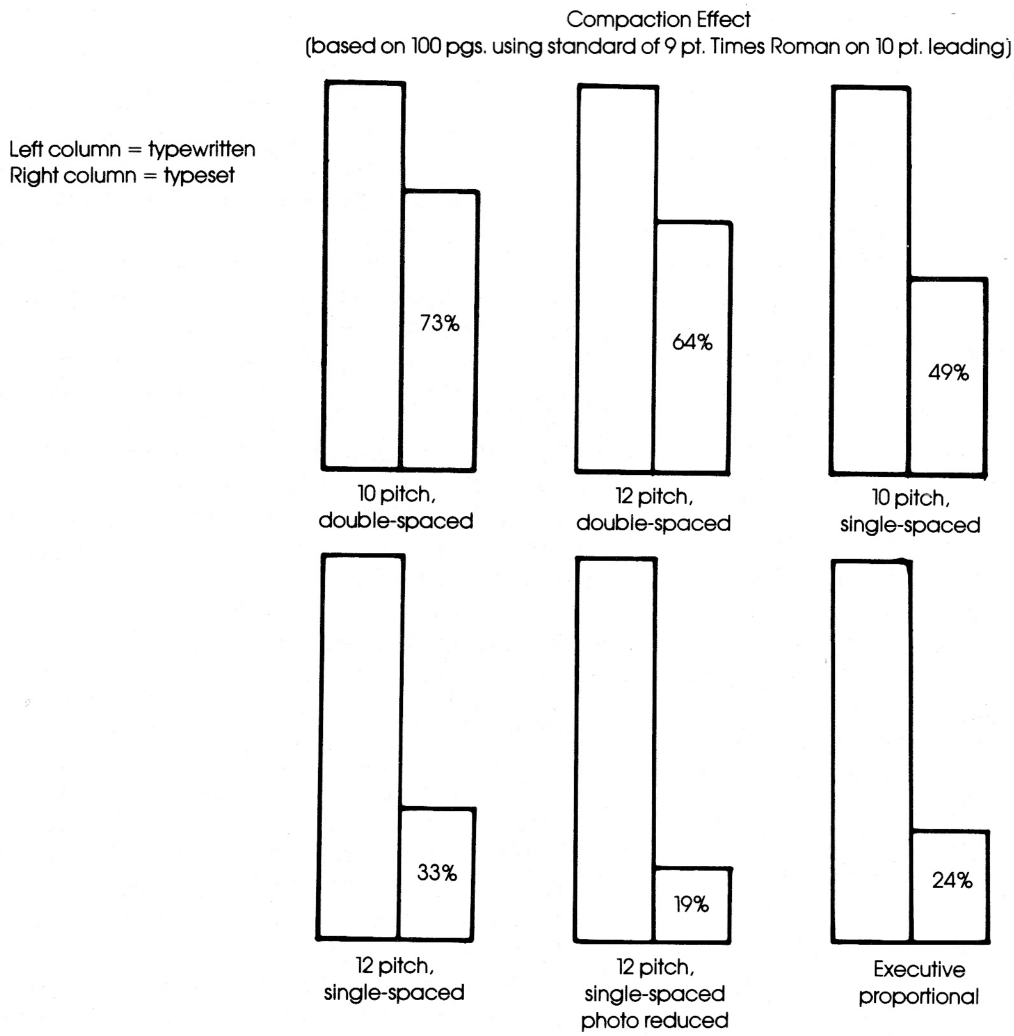


Figure 16–3

Bouscher Associates
Londonderry, New Hampshire

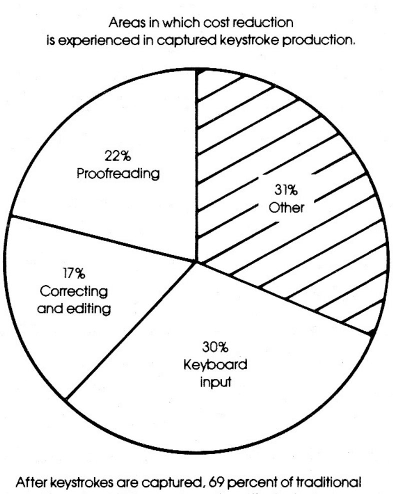


Figure 16–4

Bouscher Assoc.
Londonderry,
New Hampshire

RULE OF 100

In choosing whether a multiple-page document should be typewritten or typeset, use the Rule of 100. In this rule, N equals the number of pages (minimum of four) and C equals the number of copies (minimum of 20).

If NC = 100 or more, and the input is from captured keystrokes, then the document is a candidate for typesetting.

Figure 16–5

Many vendors are in the market for only brief periods of time. Care should be given to selecting a vendor who has been in business for a while or who appears to have a stable future.

A quick way to check out vendors initially is to use an information source such as Datapro Research Corp. of Delran, New Jersey. Such sources give unbiased data on many considerations, from prices to the length of an average service call in a particular geographical area.

PLACEMENT

Once equipment has been selected, the next consideration is placement. Equipment placement may follow three general patterns: centralized, decentralized, or customized (or *hybrid*). In a *centralized* design, the reproduction equipment is centrally located in one area. In a *decentralized* plan, equipment is located in each department. The *customized* system uses elements of both the centralized and decentralized systems. For example, copiers could be placed in every department, but typesetting and printing might be housed in a special office.

Centralization and decentralization have complementary advantages and disadvantages. The centralized system provides reproduction services to offices which could not justify the equipment. It reduces costs, since some machines can be eliminated and different departments' requirements can be consolidated. Maintenance is more consistently and easily provided, since it can be assigned to a single person or team. Centralized facilities can offer machines capable of different types of reproduction. With a concentration of machines, full-time staffing becomes necessary, and the purchase of more sophisticated equipment can be justified more easily.

A major advantage of a decentralized facility is that walking and waiting time is reduced, and in many cases eliminated, thereby reducing the delay in obtaining copies. Smaller, less sophisticated, and less expensive equipment can be scattered throughout a large area, with the support service adjacent to the primary work area.

Most large companies have departments in which duplication needs differ widely. For instance, engineering departments may use diazo copiers for blueprints and drawings. Advertising departments may need flat-bed copiers for odd-size and oddly shaped advertising materials. Accounting departments may require copiers that are capable of handling 11- by 17-inch ledger sheets.

A company needs to weigh these considerations before deciding the proper placement of equipment. Both use analysis and cost analysis need to be considered before a decision is made.

CAUTIONS

After the equipment has been selected and placed, the decision-making process is still not over. Care should be given to eliminating sources of waste and to preventing illegal reproduction.

Waste

Waste can occur in any of the reproduction processes or imaging systems. Systems should be monitored to prevent personal items, or documents having nothing to do with the company, from being copied. Misuse of the copying machine is common. Careful analysis may show that it is being used for chain letters, the spouse's work, recipe clubs, Christmas letters, or personal income tax forms. This activity adds considerable extra cost to the company. In addition, the equipment may be tied up by personal use which delays actual company work.

Another source of waste is improper use. Careful proofreading before making multiple copies is essential to prevent redoing a job and wasting paper. Waste from copier misuse can become quite heavy. For instance, employees may tend to make more copies of a document than are really needed. Frequently, separate copies are made for everyone who might conceivably have an interest in the subject covered, and even for staff members who have no interest whatsoever. Often, a single copy of a document can be routed to interested persons, eliminating the expense of making individual copies. The ready availability of copies may encourage unnecessary storage of all sorts of materials in little-used separate files. This procedure not only wastes the copies, but also wastes time and filing space. Another common misuse of the copier occurs when the counter is left on a high number; the next individual may not notice and proceed to run numerous copies when only one was wanted.

Illegal Reproduction

Reproduction laws are rather like speed limit laws—many people forget they exist. Although illegal reproduction involves much less risk than speeding, the financial penalty can be even greater.

The federal copyright law is intended to protect a publisher or author from plagiarism. It gives a publisher or author the right to say who may reproduce a published work and to demand payment for it. However, the widespread use of copying machines in reproducing published works goes beyond plagiarism. It can seriously affect the sale of published works such as magazines, textbooks, and technical papers. Before the arrival of the copying machine, a user who wanted copies of such works had to purchase the publications or borrow them for an indefinite period. Now, quality reproduction of almost any work is both easy and inexpensive.

Extra caution is needed to avoid violating the copyright law on all types of reproduction processes. Whenever a notice of copyright or intent to copyright appears, the law is clear: Only small portions of the work may be copied unless permission of the publisher or author is obtained.

Congress, by statute, has forbidden the copying of the following materials. Penalties of fine or imprisonment can be imposed on those guilty of making such copies.

1. Copyrighted material of any manner or kind without permission of the copyright owner. The law does permit copying in limited amounts, for personal or classroom purposes only, under a "fair use" provision.
2. Obligations or securities of the United States government, such as paper money, postage stamps, United States bonds, and Federal Reserve bank notes.
3. Passports, immigration papers, draft registration cards, and (in some states) automobile licenses, driver's licenses or permits, and automobile certificates of title.
4. Personnel papers may not be copied without the permission of the person involved. The Right of Privacy Act states that information of a personal and private nature must have the permission of the individual for copying or sharing.

REVIEW QUESTIONS

True / False

Directions: Write a "T" in the blank if the statement is true, and an "F" if the statement is false.

_______ 1. Management support of the feasibility study is not important.

_______ 2. Feasibility studies can be conducted in-house or with outside help.

_______ 3. It is generally best to have an equipment vendor conduct the feasibility study.

_______ 4. In-house typesetting can save a company as much as 50 to 75 percent of outside costs.

_______ 5. Renting is always the best method of acquiring equipment.

_______ 6. The amount of training time offered by vendors is standardized throughout the industry.

_______ 7. After the equipment is selected and placed, the decision-making process is over.

_______ 8. If possible, a single copy of a document should be routed, thus eliminating the expense of making individual copies.

_______ 9. Copy machines can seriously affect the sale of published works.

_______ 10. Only small portions of a work may legally be copied unless permission of the publisher or author is obtained.

Multiple Choice

Directions: In the blanks, write the letter of the choice that best completes each statement.

_______ 1. The first step in equipment selection is
a. choosing a vendor
b. completing a feasibility study
c. creating new procedures
d. hiring equipment operators

_______ 2. After the equipment has been selected, the next consideration is
a. the feasibility study
b. service
c. how to get management involved
d. placement of the equipment

_______ 3. The best equipment placement is
a. centralized
b. decentralized
c. customized
d. dependent on the company's needs

_______ 4. Copier waste may be caused by
a. using the copier for personal items
b. having to make extra copies because the operator did not find errors before the first copy
c. making more copies than needed
d. all of the above

_______ 5. Fines or imprisonment cannot be imposed for making copies of
a. personnel papers
b. automobile certificates
c. published material in limited copies for classroom use
d. money

SUGGESTED ACTIVITIES

a. Develop a written form that could be used in conducting a feasibility study of reproduction needs.
b. Read three current periodicals on centralized, decentralized, or customized reproduction facilities. Prepare an oral or written report.
c. Using library resources, make a complete list of documents that cannot be legally copied.

GLOSSARY

Analog Transmitter. A facsimile transmitter that scans a document line by line at a constant speed, reading both white space and images, and converts the copy to electronic signals.

Aperture Card. A card with a rectangular hole for holding microfilm.

Ascender. The vertical portion of a lowercase letter which extends above the body, such as *b, d,* and *l.*

Asymmetrical. A page design in which each line of copy is laid out with no particular length or placement.

Backing Sheet. A heavy, smooth-surface sheet on which a stencil is mounted.

Baseline. An imaginary line at the base of the body of capital and lowercase letters.

Basis Weight. *See* Substance.

Binding. The process of fastening multiple pages of a copy into a booklet or book.

Black Box. An electronic module that automatically translates a signal from cue message protocol to another protocol.

Boldface. A heavier and darker version of the regular weight of a typeface.

Bond. A type of paper used primarily for commercial printing of letterheads and office forms.

Bristol. A heavy paper, thicker than bond or ledger; used for index cards and business cards.

Bubble Memory. Computer memory in which magnetic domains move about the surface of a microprocessor chip to add to, move, or delete the information stored.

Burnish. A technique of applying pressure to waxed copy to cause it to stick to the surface of the board or mechanical. Also a technique used in correcting errors on stencils.

Burnisher. A tool used in burnishing; it may be a roller, the edge of a plastic or wooden stick, a glass rod, rounded end of a paper clip, or top end of a ball-point pen.

Caliper. The thickness of a single sheet of paper, measured under controlled standard conditions and expressed in thousandths of an inch or in points.

Caps. Abbreviation for *capital letters;* also called uppercase.

CAR. *See* Computer-Assisted Retrieval.

Carbon. Paper coated with a carbon-black compound mixed with a wax base; used in making carbon copies. Also a type of ribbon used in typewriters and printers.

Casting. A typesetting system (such as linotype) that uses hot molten metal in forming characters of type; the typesetting machine has a keyboard similar to a typewriter.

Cathode Ray Tube. A television-type tube used to display text on word processors; abbreviated CRT.

Centered. Text placed in the middle of a line, equally distant from the left and right margins.

Centralization. An office design in which all equipment is centrally located in one area.

Character. An individual letter of the alphabet (uppercase or lowercase), a number, punctuation mark, or pi symbol.

Character Compensation. Reduction of the white space between characters for tighter fit.

Characters per Pica. The number of lowercase letters of a specific type that will fit into a space one pica wide.

CIM. *See* Computer Input Micrographics.

Clip Art. Copyright-free illustrations, line drawings, and screened pictures printed on pages that can be cut out for use on a mechanical or pasteup.

Cold-Pressure Fusing. Newly developed process that makes copies without using heat to fuse the toner or ink to the paper.

Cold Type. Composition that is produced photographically (as on a phototypesetter) or by strike-on methods (such as typewriter).

Collate. To assemble the pages of a document in the correct order.

COM. *See* Computer Output Microfilm.

Composing Stick. A stick used to hold a line of handset type.

Comprehensive Layout. A layout made with great care which shows exactly how the finished job will look; often called a *comp.*

Computer-Assisted Retrieval (CAR). A system that combines on-line digital data and supportive textual or graphic information; controlled by and accessed through the computer terminal.

Computer Graphics. Equipment consisting of a CRT screen keyboard and either a floppy or a hard disk drive memory system; converts digitized data into graphics.

Computer Input Micrographics (CIM). A system by which information in a computer can be output onto a microfilm by COM, and then read back into the computer by CIM.

Computer Output Micrographics (COM). A process for converting the data on a magnetic computer tape directly onto microfilm by means of a cathode ray tube, electron beam, or other electronic process.

Condensed. Type design with a narrower-than-normal width.

Copyfitting. Determining the amount of manuscript copy that can fit into a given area for a specified size and style of type.

Core Memory. Computer memory consisting of large numbers of magnetized iron circles, each strung together like beads on a wire.

CRT. *See* Cathode Ray Tube.

Cushion Sheet. A sheet with a waxy surface included between the stencil sheet and the backing sheet.

Daisy Print Wheel. Flower-shaped printing device with a different letter on each spoke.

Decentralization. An office systems design in which equipment is located in departments throughout a company.

Decorative Type. Novel styles or faces used primarily to command attention.

Depth. The distance, measured in picas, from top to bottom of a typed or typeset area, or of a piece of artwork.

Descender. The part of the letter that extends below the baseline of the other letters, as in *j, p,* or *q.*

Diazo. A copy process for making blueprints and other large documents; the original must be on translucent paper.

Die Cutting. Cutting designs in paper or similar materials with a sharp printing die.

Diffusion Transfer. A copy process in which the original and negative paper are placed together and rotated around a filtered lamp.

Digital Transmitter. Similar to an analog transmitter, except that it reads for black images only, eliminating the white spaces, and then codes the information by a data-compression technique.

Disk or Diskette. A plastic-like disk coated with a ferrous compound and enclosed in a protective folder; used to store digital information.

Display-Based System. A word processing system that offers a video display of a partial or full page.

Display Characters. Typefaces ranging from 14 to 72 points in size; generally used for advertisements, title pages, and chapter headings.

Distributed-Logic System. Computer system resembling a shared-logic system, in which the logic (computer intelligence) has been dispersed to the terminal, the printer, the storage center, and other peripherals.

Ditto. Another name for fluid or spirit duplicating; also the brand name of a fluid duplicator.

Dual Spectrum. A copy process that requires two kinds of copy paper; light creates a latent image on an intermediate paper, which produces an image on a final copy paper by means of heat.

Duplexing. Making images on both sides of the paper on a copy machine.

Duplicating Bond. Paper for use with fluid duplicators.

Durability. The ability of paper to withstand conditions imposed through use, such as handling, erasing, and folding.

Dye Transfer. A copy process in which the original is exposed along with a matrix to incandescent light and then immersed in an activator solution for development.

Electronic Scanner. *See* Electronic Stencil Cutter.

Electronic Stencil. A special stencil used on an electronic stencil cutter.

Electronic Stencil Cutter. A device employed to produce masters for the stencil duplicating process; the unit reproduces an original document image on special electrically conductive master material.

Electronic Typewriter. A typewriter with a small buffer memory for minimal text or phrase storage and recall; a number of automatic features, such as centering, error correction, numeric alignment, underlining, and carrier return, are common.

Electrostatic. A method of making copies in which the reflected image of an original document is converted into a static charge that attracts toner imaging material to the surface of a copy sheet.

Element. The interchangeable type font of an impact printing device.

Embossing. Producing a raised image on the surface of a sheet of paper by pressing it between special dies.

Em Space. A blank space equal in width to the point size of a font (roughly, the lowercase *m*); used frequently for paragraph indentions.

Engraving. Printing from an engraved or incised surface; used for bonds, certificates, currency, and stamps.

En Space. A blank space half of the value of the em space. Used in alignment of figures, columns, and indentations.

Expanded. Type design with a wider-than-normal width.

External Storage. Computer data stored in the form of paper tape, magnetic tape, magnetic card, or diskettes.

Facsimile (Fax). Process of reproducing copy transmitted electronically over a distance.

Fax. *See* Facsimile.

Felt Side. The front (and better) side of a piece of paper.

Fiber Optics. Smooth, fine glasslike tubes that transmit light pulses based on digital information.

Film Sheet. A thin layer of plastic film mounted on top of the stencil sheet; prevents the wax from sticking to the type so that the type does not have to be cleaned as frequently.

Finish. A paper's surface characteristics.

Finished Layout. A layout in which the artwork and photographs are drawn so that they look like the final copy.

Finishing Procedures. Procedures that typically occur after material is printed in order to complete the project.

Fixed Space. In typesetting, blank space of a fixed width; the em, en, and thin spaces are fixed for a given point size.

Floppy Disk. *See* Disk or Diskette.

Fluid Duplicating. Machine copying process using a spirit fluid that moistens the copy paper rather than the master; also called *direct, ditto, liquid,* or *spirit.*

Fluid Master. An image master employed in the fluid duplicating process.

Fluoroscope. An illuminated drawing board and tracing frame designed for the preparation of stencils.

Folding. The process of folding the final printed copy into a book or pamphlet.

Formatting. The use of complex command codes to achieve specific typographical effects.

Grain. The direction in which the fibers of the paper run.

Gravure. Printing method that uses a surface covered with tiny wells for transferring the ink to paper; the most widely used *intaglio* method.

Gutter. The white space between columns of type.

Halftone. A reproduction of a photograph or artwork that uses dots of different sizes to reproduce highlights, shadows, and intermediate tones.

Handset. Type composition produced with individual letters or characters.

Hardware. The physical parts, mechanisms, and assemblies that make up a business machine.

Hard-Wired Logic. The use of electronic circuits to perform computer operations that could also be performed by software programs.

Head, Heading, or Headlining. A display line at the top of printed matter.

Hot Type. Form of typesetting where molten metal is poured into character matrices, forming a solid line of metal type.

Hyphenation. The division of a word between syllables at the end of a line.

IC/P. *See* Intelligent Copier and Intelligent Printer.

Impact Printer. A printer that has a printing device hitting a platen.

Initial Letter. An oversized character used at the beginning of a paragraph for effect.

Ink-Jet Printer. A nonimpact printer in which characters are formed by the spraying of electrostatically charged droplets of ink onto paper.

In-Plant Printing. Production of documents by printing or duplicating methods within the organization, rather than by an outside printing vendor.

Input. Text or other data that is entered into a computer for processing or analysis.

Intelligent Copier. Device that can print from digitized data as well as hard-copy original material.

Intelligent Printer. A nonimpact machine that acts as a high-speed printer for word processing or data processing.

Interface. The connection of two pieces of electronic or computer equipment so that they can communicate with each other.

Internal Storage. Electronic storage of information within a computer.

Italic. Type style that slants to the right; used for emphasis.

Justification. Spacing a line of type to fill the measure.

Kerning. The reduction of white space between individual characters to provide a better typographic fit.

Laser. A directed beam of intense light; that is capable of carrying millions of messages simultaneously by using the light to shape characters on a photosensitive surface before a toner transfers the image to paper.

Leaders. Groups of dots or dashes (. . .) used to guide the eye to another area within the line.

Leading. Space between the lines of a typeset page, measured from one baseline to the next; used to add readability to the text.

Ledger. Heavier weight of paper with a slightly different finish than bond paper.

Lettering Guide. Guide for drawing letters on a fluid master, a stencil, or other master.

Letterpress. Printing method that presses inked type or plates against paper.

Letterspacing. Additional amounts of space placed between characters to help justify a line.

Light Table. A table with a frosted glass or plastic top over a light source; used in tracing and pasteup.

Line Length. The measure or width of a line of type, measured in inches for typewritten copy and in picas for typeset copy.

Line Space. *See* Leading.

Lithography. *See* Offset.

Loose-Leaf Fastening. Post or ring fasteners, with which sheets may be added and removed easily.

Lowercase. The small (noncapital) letters in a typeface.

Magnetic Card. A tab-size card with a magnetic coating, holding 50 to 100 lines of text and codes.

Magnetic Tape. Plasticlike tape with a magnetic coating on which information may be stored; similar to home recording tape.

Mainframe. The central processing unit of a large computer that controls computation, input, output, and the operation of auxiliary attachments.

Manila. Heavy yellow paper used for file folders, heavy envelopes, and wrapping and packing papers.

Markup. Marking copy with specifications including typeface, size, measure, and leading prior to composition.

Masterset. In the fluid duplicating process, an original sheet of white paper attached to a sheet of duplicator carbon coated with a waxlike dye or dye-forming substance.

Matrix Printer. An impact printer using closely spaced dots to form characters of almost any shape.

Mechanical. A completed camera-ready pasteup.

Mechanical Fastening. A method of punching holes near the spine of the book and inserting metal or plastic bindings so the book will lie flat when opened.

Mechanical System. A system using magnetic cards, cassettes, tape cartridges, disks or diskettes for storage; sometimes called a blind system when compared with video-display.

Media. The materials on which information is recorded; singular *medium*.

Media Conversion. Changing or switching existing files to a different medium.

Media Incompatibility. Situation in which information is unusable because equipment is designed for a different medium.

Metal Composition. Hot type or handset type.

Microcomputer. A desktop-size computer used for data processing and word processing.

Microfiche. Microform containing multiple images in a grid pattern on a stiff sheet of film.

Microfilm Jacket. Two rectangular pieces of transparent polyester material that are sealed together on two sides, divided into channels into which microfilm can be inserted.

Microform. A generic term for any form containing microimages.

Micrographics. Process of producing or reproducing information in miniaturized form.

Microprocessor. An integrated circuit that contains the logic elements for manipulating and processing data.

Mimeo-Bond. A coarse textured, absorbent paper used with mimeograph or stencil duplicators.

Mimeograph. *See* Stencil Duplicating.

Mimeoscope. *See* Fluoroscope.

Minicomputer. A medium-size computer of limited capabilities; often used with several terminals.

Modem. A device used for converting digital information to tones or frequencies that can be transmitted by telephone lines; the name stands for modulator-demodulator.

Modern. A style of type designed almost 200 years ago, with straight lines, square serifs, and great contrast between thick and thin elements.

Mylar Carbon. A typewriter ribbon of microscopically thin mylar which has absorbed liquid ink; also called *film*.

NCR Paper. Paper that will make multiple copies of business letters and forms without using carbon.

Network. The connecting of geographically separated communicating devices, such as computers. A *local network* connects users within a limited geographic area, while a *remote network* connects widely dispersed locations.

Nonimpact Printer. Printer that uses heat, electrostatic, ink-jet, or another process to produce characters on paper.

OCR. *See* Optical Character Recognition.

Odd-Size Paper. Paper in a size other than the standard 8½ × 11 inches.

Offset or **Offset Lithography.** A printing process in which ink from the plate is transferred to a rubber blanket and then offset onto the paper.

Offset Plate. The paper or metal plate used in making offset copies; divided into an *impression area* that retains ink and a *nonimpression area* that retains water.

Oldstyle. A type style patterned after the letter forms used on classical Roman inscriptions.

Onionskin. A thin, lightweight-bond used for file copies of correspondence and forms; sometimes called manifold or tissue.

Opacity. The degree to which printing or writing on one side of a sheet of paper will show through to the other side.

Optical Character Recognition (OCR). A system using a device or scanner that can read printed or typed characters and convert them into a digital signal for input into a word processor or phototypesetter.

Output. The product of a computer used for keyboarding; also the final typeset copy.

Page Makeup. The process of arranging type or other elements attractively on a page according to a desired format; may be performed manually or by computer.

Paper Cut. Process of cutting printed paper to the desired size.

Paper Tape. A strip of paper on which characters are represented by combinations of punched holes; used to store digital information.

Parameters. Specifications that may be made by the user of a typesetting device.

Pasteup. Positioning and attaching art and type elements to a base sheet; a pasteup is camera-ready copy used for reproduction; also called a *mechanical*.

Pasteup Board. A board used in making layouts and pasteups.

Perfect Binding. A method of binding in which the folded spine edge is trimmed and covered with glue before attaching a cover.

Permanence. The ability of paper to resist deterioration under various conditions of storage.

Photocomposition. Typesetting by phototypesetter; also called *cold type*.

Phototypesetter. A device to set type on photographic film or paper.

Pica. Unit of measurement in typesetting, equal to one-sixth of an inch.

Pi Characters. An assortment of odd or nonstandard characters not found on a regular keyboard; examples are bullets, stars, rules, boxes, and arrows.

Pitch. The number of letters or characters a typewriter types in a line one inch long.

Point. A small unit of typesetting measurement; there are 12 points to a pica, and 72 points to an inch.

Print Wheel. An impact device with characters arranged on radiating spokes.

Program. A set of machine instructions for the operation of automated equipment.

Proofreader Marks. Marks used in indicating corrections on copy.

Proofreading. Checking typed or typeset material against original copy to locate errors in composition before pasteup or printing.

Proportional Spacing. Feature of some typewriter faces, in which the characters' horizontal spacing varies with their usual width.

Ragged Left. Type set with a flush right margin and an uneven left margin.

Ragged Right. Composition set with a flush left margin and an uneven right margin.

Recycled Paper. Wastepaper that has been reclaimed and used for new paper products.

Reprographics. The reproduction and duplication of documents or written materials; includes all auxiliary bindery operations.

Resolution. A measure of the sharpness of an image.

Reverse. An image in which the black and white areas are the opposite of those in the original.

Roll Film. A roll of microfilm held in a cartridge or cassette, suitable for recording large amounts of paperwork that can be numbered in sequence.

Rough Layout. A sketch of what a finished product will look like; also called a *rough*.

Rub-on or **Transfer Letters.** Sheets of characters, type, symbols, and borders on a transparent carrier sheet, transferred onto another surface by rubbing or burnishing.

Run-Around. A design in which type must be adjusted to fit around an illustration.

Saddle Stitching. A method of fastening sheets at the center of the fold by means of a wire.

Sans Serif. A typeface with no serifs.

Screening Plate. A piece of plastic etching with a pattern; used in making stencils.

Script. Typeface designed to simulate handwriting; used for special effects, formal invitations, and announcements.

Serif. The line or stroke projecting laterally from the main stroke or body of a roman letter.

Service Bureau Timesharing. Computer system in which the user makes a small investment in hardware and then relies on a timesharing firm for all software needs.

Shared-Logic System. Computer system in which the logic, storage, and central processing unit are shared among a number of keyboard stations.

Shrink-Wrap Packaging. Wrapping a package in see-through polyethlene which is heat-sealed.

Side Stitching. Binding method in which a booklet of pages is stitched from front to back at the left edge.

Soft Sewn. Binding method in which sheets are sewn together with thread inside a paper cover.

Software. A program that instructs the operations of word and data processing equipment; also other elements of a computer system, such as support books, training manuals, and so forth, that are *not* hardware.

Spirit Duplicating. *See* Fluid Duplicating.

Spirit Master. An image master used in the fluid duplicating process.

Square Serif. Typestyle with square or block serif and uniform strokes, used mainly for display, headlines, and small amounts of reading matter.

Stabilization. A copy process that uses a sheet covered with silver-sensitive emulsion combined with a developing agent.

Stand-Alone Text Editor or **Word Processor.** A single-station configuration that contains its own logic.

Stencil. An image master used in the stencil duplicating process.

Stencil Duplicating. A duplicating method that uses stencil masters and a machine inking system to produce copies.

Stencil Pack. Pack consisting of a stencil sheet, a backing sheet, and a tissue sheet.

Stencil Sheet. Sheet of fine porous fiber with special coating through which ink will not pass; the sheet is cut on a typewriter to create a duplicating master.

Storage Media. External or internal methods of storing data.

Stylus. Drawing point used in making a stencil.

Substance. The weight of one ream of paper before cutting, expressed in pounds; also called *basis weight.*

Tag. Stiff paper similar to manila but with a harder finish, used for cards and labels.

Template. A plastic guide containing patterns (circles, squares, triangles, or other shapes) for pencil and ink work on a pasteup.

Text Editor. A typewriter that permits stored information to be edited before printout.

Text Type. Typefaces from 6 to 12 points in size; usually used for setting body type.

Thermal Master. A fluid master made on a thermal or dual-spectrum photocopy machine, eliminating the need to retype an original.

Thermal Process. A copying process that uses heat-sensitive paper and infrared light to reproduce the original.

Thimble. A cup-shaped print wheel, similar to a daisy wheel.

Thumbnail Sketch. Miniature rough sketches for a proposed layout.

Time-Shared Services. Services accessed through telephone lines that allow office terminals to hook into a powerful computer located elsewhere.

Toner. Minute black particles used to create images in electrostatic copying.

Tracing Scope. *See* Fluoroscope.

Transparency. A clear sheet used on an overhead projector.

T-Square. A tool with a long straight edge and a shorter crosspiece that hooks over the edge of a drawing board; it is used to align copy and draw straight lines.

Typeface. A specific type design.

Type Family. All the variations of a basic type design, in every weight and point size.

Typing Plate. A plastic plate that is placed between the stencil sheet and the backing sheet.

Typewriter Composition. A form of cold type composition in which a typewriter is used to produce camera-ready copy.

Typography. The art of producing words and symbols from type.

Unjustified. A style in which the left margin is flush left but the right margin is *ragged* or uneven.

Vellum. A fine parchment paper used for certificates, diplomas, charters, wills, and other important papers; also used for the original in the diazo process of photocopying.

Waxer or **Waxing Machine.** A device that will apply a wax coating to the back of copy or other papers.

Winchester Disk. Rigid, hard, nonremovable random-access magnetic disk sealed in a pressurized enclosure, capable of storing millions of characters.

Wire Side. The back side of a piece of paper.

Wire Stitching. A binding method that uses staples to hold together sheets of a document along the fold.

Word Processing. The use of computers to keyboard, edit, manipulate, and print out documents.

Word Spacing. The space between the words in a line of type which is increased or decreased in order to justify a line.

X Height. The height of a lowercase letter without an ascender or descender, such as the x.

APPENDIX – LIST OF VENDORS

PHOTOTYPESETTERS

AM VARITYPER
30 Vreeland Road
Florham Park, NJ 07932
(201) 966-1033

ALPHATYPE CORP.
7711 North Merrimac Avenue
Niles, IL 60648
(312) 965-8800

AUTOLOGIC, INC.
1050 Rancho Conejo Boulevard
Newbury Park, CA 91320
(213) 889-7400

BERTHOLD OF NORTH AMERICA
610 Winters Avenue
Paramus, NJ 07652
(201) 262-8700

BOBST GRAPHIC, INC.
4000 Veterans Memorial Highway
Bohemia, NY 11716
(516) 737-0200

COMPUGRAPHIC CORP.
80 Industrial Way
Wilmington, MA 01887
(617) 944-6555

HARRIS CORP.
Composition Systems Division
P.O. Box 2080
Melbourne, FL 32901
(305) 259-2900

INFORMATION INTERNATIONAL
5933 Slauson Avenue
Culver City, CA 90230
(213) 390-8611

ITEK GRAPHIC PRODUCTS
35 Cellu Drive
Nashua, NH 03063
(603) 889-1400

ITEK COMPOSITION SYSTEMS
355 Middlesex Avenue
Wilmington, MA 01887
(617) 933-7000

MERGENTHALER LINOTYPE CO.
201 Old Country Road
Melville, NY 11747
(516) 673-4197

MONOTYPE CORP., LTD.
Salsford, Redhill
RH1 5JP, England
Redhill 65959
U.S. Office:
509 West Golf Road
Arlington Heights, IL 60005
(312) 593-5262

WANG LABORATORIES, INC.
One Industrial Avenue
Lowell, MA 01851
(617) 459-5000

LETTERING SETS AND TEMPLATES

ALVIN & CO., INC.
611 Palisado Avenue
Windsor, CT 06095
(203) 688-4931

C-THRU RULER CO.
6 Britton Drive
Bloomfield, CT 06002
(203) 234-0303

HEYER, INC.
1850 South Kostner Avenue
Chicago, IL 60623
(312) 227-0130

KEUFFEL & ESSER CO.
20 Whippany Road
Morristown, NJ 07960
(201) 285-5000

KOH-I-NOOR RAPIDOGRAPH, INC.
100 North Street
Bloomsbury, NJ 08804
(201) 479-4124

LETTERGUIDE CO., INC.
P.O. Box 30203
Lincoln, NE 68503
(402) 488-7089

TELEDYNE POST
P.O. Box 690
Chicago, IL 60690
(312) 229-1111

VARIGRAPH, INC.
P.O. Box 690
Madison, WI
(608) 256-4816

CUT-OUT, TRANSFER AND CLIP-ART GRAPHICS

ALPHATYPE CORP.
7500 McCormick Boulevard
Skokie, IL 60076
(312) 675-7210

ALVIN & CO., INC.
611 Palisado Avenue
Windsor, CT 06095
(203) 688-4931

APPLIED GRAPHICS CORP.
58 Shore Road
Glenwood Landing, NY 11547
(516) 676-1211

ARTYPE, INC.
345 East Terra Cotta Avenue
Crystal Lake, IL 60014
(815) 459-6220

CELLO-TAK MANUFACTURING CO., INC.
35 Alabama Avenue
Island Park, L.I., NY 11158
(516) 431-7733

CHARTPAK
Division of Avery Products Corp.
1 River Road
Leeds, MA 01054
(413) 584-5446

C-THRU RULER CO.
6 Britton Drive
Bloomfield, CT 06002
(203) 243-0303

DYNAMIC GRAPHICS, INC.
6708 North Sheridan Road
Peoria, IL 61614
(309) 691-0428

FOTOTYPE INC.
1414 Roscoe Street
Chicago, IL 60657
(312) 477-8700

GRAPHIC PRODUCTS CORP.
3601 Edison Place
Rolling Meadows, IL 60008
(312) 392-1476

HEIDELBERG EASTERN
73–45 Woodhaven Boulevard
Glendale, NY 11227
(212) 896-5500

INSTANTYPE, INC.
7005 Tujunga Avenue
North Hollywood, CA 91605
(213) 769-6534

KEUFFEL & ESSER CO.
20 Whippany Road
Morristown, NJ 07960
(201) 285-5000

LETRASET USA, INC.
33 New Bridge Road
Bergenfield, NJ 07621
(201) 387-0700

MACtac
Morgan Adhesives Company
Printing Products Department
4560 Darrow Road
Stow, OH 44224
(216) 688-1111

3M CO.
3M Center
Saint Paul, MN 55101
(612) 733-1110

PRESSURE GRAPHICS, INC.
1725 Armitage Court
Addison, IL 60101
(312) 620-6900

PRESTYPE, INC.
194 Veterans Boulevard
Carlstadt, NJ 07072
(201) 933-6011

REYNOLDS/LETERON CO.
9830 San Fernando Road
Pacoima, CA 91331
(213) 899-5281

TACTYPE, INC.
43 West 16th Street
New York, NY 10011
(212) 924-1800

VAN SON HOLLAND INK CORP.
Union & Liberty Streets
Mineola, NY 11501
(516) 746-2690

HARRY U. VOLK ART STUDIO
P.O. Box 4099
Rockford, IL 61110
(815) 874-9441

ZIPATONE, INC.
150 Fenel Lane
Hillside, IL 60162
(312) 449-5500

HEADLINING MACHINES

ADDRESSOGRAPH MULTIGRAPH CORP.
Varityper Division
11 Mount Pleasant Avenue
East Hanover, NJ 07936
(201) 887-8000

BERTHOLD FOTOTYPE CO.
P.O. Box 430
Bloomfield, NJ 07003
(201) 429-8800

CASTCRAFT INDUSTRIES INC.
1100 South Kostner Avenue
Chicago, IL 60624
(312) 722-6530

COMPUGRAPHIC CORP.
80 Industrial Way
Wilmington, MA 01887
(617) 944-6555

DIRECT IMAGE CORP.
1350 South Monterey Pass Road
Monterey Park, CA 91754
(213) 264-2000

FOTOTYPE, INC.
1414 Roscoe Street
Chicago, IL 60657
(312) 477-8700

GAF CORP.
Office Systems Division
140 West 51st Street
New York, NY 10020
(212) 582-7600

GESTETNER CORP.
Gestetner Park
Yonkers, NY 10703
(914) 968-6666

KROY INDUSTRIES, INC.
Pierce Division
6238 Oasis Avenue North
Stillwater, MN 55082
(612) 439-8183

3M CO.
3M Center
Saint Paul, MN 55101
(612) 733-1110

PHOTO VISION OF CALIFORNIA
P.O. Box 552
8540 West Washington Boulevard
Culver City, CA 90230
(213) 870-4828

REYNOLDS/LETERON CO.
9830 San Fernando Road
Pacoima, CA 91331
(213) 899-5281

STRIP PRINTER, INC.
P.O. Box 18-895
Oklahoma City, OK 73101
(405) 524-8479

VARIGRAPH, INC.
P.O. Box 690
Madison, WI 53701
(608) 256-4816

VISUAL GRAPHICS CORP.
1400 NE 125th Street
North Miami, FL 33161
(305) 893-7800

NUARC CO.
4100 West Grand Avenue
Chicago, IL 60632
(312) 278-3300

OSCAR FISHER CO., INC.
P.O. Box 2305
Newburgh, NY
(914) 562-3900

RICHMOND GRAPHIC SYSTEMS, INC.
123 Georgia
Providence, RI 02905
(401) 467-2552

T. G. ROBERTS, INC.
1491 Carlisle Road
North Brunswick, NJ 08902
(201) 545-0534

ROYAL ZENITH CORP.
2101 Jericho Turnpike
New Hyde Park, NY 11040
(516) 488-3200

SIMCO CO.
920 Walnut Street
Lansdale, PA 19446
(215) 368-2220

TEANECK CHEMICAL CO., INC.
197 Washington Road
Carlstadt, NJ 07072
(201) 438-2500

WESTERN LITHO PLATE
3433 Tree Court Industrial Blvd.
St. Louis, MO 63122
(800) 325-3310

WESTIN GRAPHICS
Division West Industries
114 South Center
Santa Ana, CA 92703
(714) 558-8990

LIGHT TABLES

BRIDGEPORT ENGRAVERS SUPPLY CO., INC.
30 Grand Street
Bridgeport, CT 06002
(203) 334-3268

BUCKINGHAM GRAPHICS, INC.
1416 West Roscoe Street
Chicago, IL 60657
(312) 327-8810

DOUHITT CORP.
245 Adair Street
Detroit, MI 48207
(313) 259-1565

ENRENREICH PHOTO-OPTICAL INDUSTRY
Photo Technical Products Group
623 Stewart Avenue
Garden City, NY 11530
(516) 222-0200

FOSTER MANUFACTURING CO.
1228 Cherry Street
Philadelphia, PA 19107
(215) 568-5085

GAGNE ASSOCIATES, INC.
1080 Chenango Street
Binghamton, NY 13902
(607) 723-6556

GEISS-AMERICA, INC.
7330 Niles Center Road
Skokie, IL 60076
(312) 674-5800

M.P. GOODKIN CO.
120-146 Coit
Irvington, NJ 07111
(201) 371-1199

GRAPHIC AIDS CO.
Edwal Scientific Products Corp.
12120 South Peoria
Chicago, IL 60643
(312) 264-8484

GRAPHIC ARTS DEVELOPMENT CO.
7520 Deering
Canoga Park, CA 91303
(213) 340-1171

HAMILTON INDUSTRIES
Two Rivers, WI 54241
(414) 793-1121

HEIDELBERG EASTERN, INC.
73-45 Woodhaven Boulevard
Glendale, NY 11227
(212) 896-5500

THE HOUSE OF GRIDS
P.O. Box 3797
Akron, OH 44314
(216) 848-1757

ICONICS CONTROL, INC.
3 North Ridge Avenue
Troy, OH 45373
(513) 339-2616

INTERNATIONAL ROGERSOL, INC.
5331 South Cicero Avenue
Chicago, IL 60632
(312) 735-5100

KREONITE, INC.
P.O. Box 2099
715 East 10th Street
Wichita, KS 67201

LEEDAL, INC.
2929 South Halstead
Chicago, IL 60608
(312) 842-6588

LOGETRONICS, INC.
7001 Loisdale Road
Springfield, VA 22150
(703) 971-1400

MERVAP COLD LIGHT PRODUCTS
2654 South La Cienega Avenue
Los Angeles, CA
(213) 870-2363

WAXING MACHINES

ADDRESSOGRAPH MULTIGRAPH CORP.
Varityper Division
11 Mount Pleasant Avenue
East Hanover, NJ 07936
(201) 877-8000

ARTWAXER
P.O. Box 5500
Akron, OH 44313
(216) 929-4454

THE CHALLENGE MACHINERY CO.
1433 Fulton Street
Grand Haven, MI 49417
(616) 842-8300

DAIGE PRODUCTS, INC.
160 Denton
New Hyde Park, NY 11040
(516) 248-8653

GOODKIN CO.
140-146 Coit Street
Irvington, NJ
(201) 371-1199

LECTRO-STIK CORP.
3721 Broadway
Chicago, IL 60613
(312) 528-8863

POTDEVIN MACHINE CO.
248 North Street
Teterboro, NJ 07608
(201) 288-1941

SCHAEFER MACHINE CO., INC.
Boston Post Road
P.O. Box 512
Clinton, CT 06413
(203) 669-6000

TOBIAS ASSOCIATES, INC.
50 Industrial Drive
Ivyland, PA 18974
(215) 322-1500

COPIERS

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1600 Route 22
Union, NJ 07083
(201) 964-3200

ALBIN INDUSTRIES
P.O. Box 346
24288 Indoplex Circle
Farmington, MI 48024
(313) 478-0005

AM/MULTIGRAPHICS
1800 West Central Road
Mt. Prospect, IL 60056
(312) 398-1900

APECO CORP.
2100 Dempster
Evanston, IL 60204
(312) 869-9000

BOHN REX-ROTARY
Division of Sheller-Globe
475 S. Dean St.
Englewood, NJ 07631

CANON USA, INC.
10 Nevada Drive
Lake Success, NY 11042
(516) 488-6700

CLARK COPY INTERNATIONAL CORP.
8121 N. Austin Avenue
Morton Grove, IL 60053
(312) 966-5110

COPIES, INC.
64 Niagara St.
Buffalo, NY 14202
(716) 853-6460

COPYER CO., LTD.
510 West 6th Street
Suite 723
Los Angeles, CA 90014

DELTEK INDUSTRIES
2100 Mary Street
Pittsburgh, PA 15203
(412) 431-3400

A.B. DICK CO.
5700 West Touhy Avenue
Chicago, IL 60648
(312) 763-1900

DITTO
Main Street
Whitinsville, MA 01588
(617) 234-7451

EASTMAN KODAK CO.
Business Systems Markets Division
343 State Street
Rochester, NY 14650
(716) 724-4642

ESKOFOT AMERICA, INC.
1091 Industrial Road
San Carlos, CA 94070
(415) 592-3010

GESTETNER CORP.
Gestetner Park
Yonkers, NY 10703
(914) 968-6666

GRAPHIC ENTERPRISES, INC.
439 North Market
Canton, OH 44702
(216) 452-2033

HEYER, INC.
1850 South Kostner Avenue
Chicago, IL 60623
(312) 277-0130

HOWARD PAPER MILLS CO.
P.O. Box 982
115 Columbia Street
Dayton, OH 45401
(513) 224-1211

IBM OFFICE PRODUCTS DIVISION
Parson's Pond Drive
Franklin Lakes, NJ 07417
(201) 848-1900

KIP USA, INC.
501 Grandview Drive
Suite 206
South San Francisco, CA 94080
(415) 871-0481

MAGNA PLAN CORP.
VISUAL PLANNING CORP.
431 N. Main Street
Champlain, NY 12919
(518) 298-8404

MINOLTA CORP.
Business Equipment Division
101 Williams Drive
Ramsey, NJ 07446
(201) 825-4000

MITA COPYSTAR AMERICA, INC.
158 River Road
Clifton, NJ 07014
(201) 471-9485

NASHUA CORP.
44 Franklin Street
Nashua, NH 03060
(603) 880-2874

NOLEX CORP.
6600 Valley View Street
Buena Park, CA 90620
(714) 521-9300

OCE-INDUSTRIES, INC.
6500 North Lincoln Avenue
Chicago, IL 60645
(312) 338-1700

OLIVETTI CORP. OF AMERICA
155 White Plains Road
Tarrytown, NY 10591
(914) 631-8100

OLYMPIS USA, INC.
Box 22
Somerville, NJ 08876
(201) 722-7000

OPTEX CORP.
19 Manning Avenue
Butler, NJ 07405
(201) 838-5616

PITNEY BOWES
Walnut & Pacific Streets
Stamford, CT 06904
(203) 357-9111

REMINGTON RAND CORP.
Princeton Forrestal Center
103 College Road East
Princeton, NJ 08540
(609) 799-8950

RONEO VICKERS, INC.
1 Alsan Way
Little Ferry, NJ 07643
(201) 440-5670

ROYAL BUSINESS MACHINES, INC.
150 New Park Avenue
Hartford, CT 06106
(203) 523-4881

SAVIN BUSINESS MACHINES
Valhalla, NY 10595
(914) 769-9500

SAXON BUSINESS PRODUCTS
Red Road at NW 139th Street
Miami Lakes, FL 33014
(305) 822-0500

SCM BUSINESS EQUIPMENT
299 Park Avenue
New York, NY 10017
(212) 752-2700

SELECTRO PAPER CORP.
602 Lorimer Street
Brooklyn, NY 11211

SHARP ELECTRONICS
10 Keystone Place
Paramus, NJ 07652
(201) 265-5600

SPEED-O-PRINT
BUSINESS MACHINES
1801 West Larchmont Avenue
Chicago, IL 60613
(312) 477-2000

STANDARD DUPLICATING
MACHINES
1935 Revere Beach Parkway
Everett, MA 02149
(617) 287-5070

STANDARD REX-ROTARY
475 S. Dean Street
Englewood, NJ 07631
(201) 871-3070

3M CO.
Duplicating Products
St. Paul, MN 55101
(612) 733-0719

TOSHIBA AMERICA, INC.
82 Totowa Road
Wayne, NJ 07470
(201) 628-8000

VAN DYK RESEARCH
45 South Jefferson Road
Whippany, NJ 07981
(201) 887-8500

XEROX CORP.
Xerox Square
Rochester, NY 14644
(716) 423-9200

YORKTOWN INDUSTRIES
330 Factory Road
Addison, IL 60101
(312) 543-6110

OFFSET DUPLICATORS

A.B. DICK CO.
5700 West Touhy Avenue
Chicago, IL 60648
(312) 763-1900

AM INTERNATIONAL, INC.
Marketing Division
1834 Walden Office Square
Schaumburg, IL 60196
(312) 397-1900

AM INTERNATIONAL, INC.
1900 Avenue of the Stars
Los Angeles, CA 90067
(213) 556-9637

ATF/DAVIDSON CO.
Main Street
Whitinville, MA 01588
(617) 234-7451

BOHN REX-ROTARY
Division of Sheller-Globe
475 S. Dean St.
Englewood, NJ 07631

CASE WORD PROCESSING
SUPPLY
42 W. 48th Street
New York, NY 10036
(212) 757-8890

DIDDE GRAPHIC SYSTEMS CORP.
1200 Graphic Arts Road
Emporia, KS 66801
(316) 342-4740

GESTETNER CORP.
Gestetner Park
P.O. Box 819
Yonkers, NY 10702
(914) 968-6666

GRAPHIC COMMUNICATIONS
CORP.
25 Graphic Place
Moonachie, NJ 07074
(201) 641-5100

HALM INDUSTRIES CO., INC.
Glen Head Road
Glen Head, NY 11545
(516) 676-6700

HAMADA OF AMERICA, INC.
1816 American St.
Anaheim, CA 92801
(714) 871-7540

HCM CORP.
115 Cutter Mill Road
Great Neck, NY 11012
(516) 466-0710

HEIDELBERG, USA
73-45 Woodhaven Boulevard
Glendale, NY 11227
(212) 896-5500

IOA DATA CORPORATION
383 Lafayette Street
New York, NY 10003
(212) 673-9300

INTERCONTINENTAL
BUSINESS METHODS, INC.
1477 E 85th Street
Brooklyn, NY 11236

ITEK GRAPHIC PRODUCTS
DIVISION, ITEK CORP.
P.O. Box 1970
811 Jefferson Road
Rochester, NY 14692
(716) 244-5600

ROBERTS & PORTER, INC.
1001 Morse Avenue
Elk Grove Village, IL 60007
(312) 956-1750

ROTAPRINT CO.
6 Demarest Place
Waldwick, NJ 07463
(201) 444-1301

ROYAL-AMERICAN PRODUCTS
1920 W. Olympic Blvd.
Los Angeles, CA 90006
(213) 380-3311

ROYAL ZENITH CORP.
2101 Jericho Turnpike
New Hyde Park, NY 11040
(516) 488-3200

SOLNA CORP.
50 Lafayette Place
Kenilworth, NJ 07003
(201) 276-2000

WESTERN PAPER CO.
Box 12210
Overland Park, KS 66212
(913) 649-5303

FLUID DUPLICATORS

A.B. DICK CO.
5700 West Touhy Avenue
Chicago, IL 60648
(312) 763-1900

ACCOUNTING SUPPLIES
& SYSTEMS, INC.
Box 21
Falls Church, VA 22046

BOHN REX-ROTARY
Division of Sheller-Globe
475 S. Dean St.
Englewood, NJ 07631

COPY PLUS CORP.
5744 West Good Hope Road
Milwaukee, WI 53223
(414) 353-2704

DELTEK INDUSTRIES
2100 Mary Street
Pittsburgh, PA 15203
(412) 431-3400

DITTO
Main Street
Whittenville, MA 01588
(617) 234-7451

DU PRINTS, INC.
1502 South Main Street
Los Angeles, CA 90015

HEYER, INC.
1850 South Kostner Avenue
Chicago, IL 60623
(312) 277-0130

INTERCONTINENTAL BUSINESS
METHODS, INC.
1477 E. 85th Street
Brooklyn, NY 11236

RONEO VICKERS, INC.
One Alsan Way
Little Ferry, NJ 07643
(201) 440-5670

ROYAL-AMERICAN PRODUCTS
1920 W. Olympic Blvd.
Los Angeles, CA 90006
(213) 380-3311

SPEED-O-PRINT BUSINESS
MACHINES CORP.
1801 W Larchmont Avenue
Chicago, IL 60613
(312) 477-2000

STANDARD DUPLICATING
MACHINES CORP.
10 Connector Road
Andover, MA 01810

STENCIL DUPLICATORS

A.B. DICK CO.
5700 West Touhy Avenue
Chicago, IL 60648
(312) 763-1900

ACCOUNTING SUPPLIES &
SYSTEMS, INC.
Box 21
Falls Church, VA 22046

BOHN REX-ROTARY
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475 S. Dean St.
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Canada
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APPENDIX — PRODUCTION WORK

Instructions: Retype this list. Duplicate it by available reproduction methods.

TWO-LETTER STATE ABBREVIATIONS

STATES

	Old	New
Alabama	Ala.	AL
Alaska	. . .	AK
Arizona	Ariz.	AZ
Arkansas	Ark.	AR
California	Calif.	CA
Colorado	Colo.	CO
Connecticut	Conn.	CT
Delaware	Del.	DE
District of Columbia	D.C.	DC
Florida	Fla.	FL
Georgia	Ga.	GA
Hawaii	. . .	HI
Idaho	. . .	ID
Illinois	Ill.	IL
Indiana	Ind.	IN
Iowa	. . .	IA
Kansas	Kans.	KS
Kentucky	Ky.	KY
Louisiana	La.	LA
Maine	. . .	ME
Maryland	Md.	MD
Massachusetts	Mass.	MA
Michigan	Mich.	MI
Minnesota	Minn.	MN
Mississippi	Miss.	MS
Missouri	Mo.	MO
Montana	Mont.	MT
Nebraska	Nebr.	NE
Nevada	Nev.	NV
New Hampshire	N.H.	NH
New Jersey	N.J.	NJ
New Mexico	N. Mex.	NM
New York	N.Y.	NY
North Carolina	N.C.	NC
North Dakota	N. Dak.	ND
Ohio	. . .	OH
Oklahoma	Okla.	OK
Oregon	Oreg.	OR
Pennsylvania	Pa.	PA
Rhode Island	R.I.	RI
South Carolina	S.C.	SC
South Dakota	S. Dak.	SD
Tennessee	Tenn.	TN
Texas	Tex.	TX
Utah	. . .	UT
Vermont	Vt.	VT
Virginia	Va.	VA
Washington	Wash.	WA
West Virginia	W. Va.	WV
Wisconsin	Wic.	WI
Wyoming	Wyo.	WY

U.S. POSSESSIONS

Canal Zone	CZ
District of Columbia	DC
Guam	GU
Puerto Rico	PR

CANADIAN PROVINCES

Alberta	AB
British Columbia	BC
Labrador	LB
Manitoba	MB
New Brunswick	NB
Newfoundland	NF
Northwest Territories	NT
Nova Scotia	NS
Ontario	ON
Prince Edward Island	PE
Quebec	PQ
Saskatchewan	SK
Yukon Territory	YT

Instructions: On color paper of your own choosing, retype this poem on English plurals. If the poem is retyped on a Selectric typewriter, use a script typeface. The poem title should be in larger type than the body of the poem.

ENGLISH PLURALS

(Anonymous)

We'll begin with a box for which the plural is boxes,
But the plural of ox is written oxen, not oxes;

Then one fowl is a goose but two are called geese,
Yet the plural of mouse should never be meese.

You may find a lone mouse or a whole set of mice,
Yet the plural of house is houses not hice.

If the plural of man is always men,
Why shouldn't the plural of pan be pen?

If I speak of a foot and you show me your feet,
And I give you a boot, would a pair be called beet?

If one is a tooth and a whole set are teeth,
Why should not the plural of booth be called beeth?

And one may be that, and three would be those,
Yet hat in the plural wouldn't be hose,
And the plural of cat is cats and not cose.

We speak of a brother and also of brethren,
But though we may say Mother, we never say Methren.

The masculine pronouns are he, his, and him
But imagine the feminine she, shis, and shim.

So English, I fancy, you will agree,
Is the silliest language you ever did see.

Instructions: Retype this copy. Justify the right margin. Experiment with various color combinations of ink and paper to see if you agree with what is said in these paragraphs.

COLOR VISIBILITY

Yellow is the color of highest visibility. Combined with black, it is the most legible. Green on white follows next in order—then red on white, blue on white, white on blue, with black on white running sixth in visibility. These combinations are best suited for posters and business or road signs.

Black on white or ivory has been found to be the most preferable combination for use in books, magazines, and other reading material where problems of ease of seeing (not visibility alone) are factors to be considered. Bright colors such as yellow tend to tire the eyes after prolonged concentration and will also produce afterimages.

Tinted backgrounds for reading have proven less desirable than the black on ivory or white. When prolonged reading concentration is not required, tints of pale yellow, peach, tan or buff may be used effectively. Contrary to popular belief that a green tint is restful to the eyes, it has been found that any toning of green on paper increases the tendency to ocular fatigue and discomfort.

Naturally, the degree and intensity of illumination surrounding the reading material greatly influences the visibility of various color combinations. Black on white is most legible in poor light, as well as being clearly visible in bright light.

Instructions: Retype this copy on a full sheet of paper. Duplicate it by a standard reprographic method.

TABLE OF EXCUSES

(Anonymous)

To save everyone's time, including your own, the next time you have to give an excuse for doing or not doing something use this list. Put a checkmark next to the appropriate excuse and send the list to the person making the inquiry.

1. ____ That's the way we've always done it.
2. ____ I didn't know you were in a hurry for it.
3. ____ That's not in my department.
4. ____ No one told me to go ahead.
5. ____ I'm waiting for an o.k.
6. ____ That's his job—not mine!
7. ____ Wait till the boss comes back and ask him.
8. ____ I forgot.
9. ____ I didn't think it was very important.
10. ____ I'm so busy I just can't get around to it.
11. ____ I thought I told you.
12. ____ A committee is considering it.

Instructions: Center this copy horizontally and vertically on a full sheet of paper. Choose a duplication method and run 5 copies.

WHICH TYPEWRITING SYSTEM DO YOU USE?

Bible System	"Seek and ye shall find"
Columbus System	"Locate a key and land on it"
Chicken System	"Hunt and peck"
Railroad System	"Stop, look, and list"
Boxer System	"Peak and punch"
Filing System	"One letter at a time"
Jury System	"Trial. Judge. Error"
Motorboat System	"Putt, putt, putt"
Society System	"Look down, look up"
Baseball System	"Hit and run"

Instructions: Duplicate on cards. Use two colors. Make 10 copies.

TELEPHONE OPERATOR'S SPELLING RULES

A for Alice	N for Nellie
B for Bertha	O for Oliver
C for Charles	P for Peter
D for David	Q for Quaker
E for Edward	R for Robert
F for Frank	S for Samuel
G for George	T for Thomas
H for Henry	U for Utah
I for Ida	V for Victor
J for James	W for William
K for Kate	X for X-ray
L for Louis	Y for Young
M for Mary	Z for Zebra

Instructions: Retype this copy. Experiment with various color combinations of ink and paper.

SEVENTEEN WORDS OF ADVICE ON ACHIEVING SUCCESS

- Give your enthusiasm to everybody.
- Be yourself and become genuinely interested in people.
- Be fair, honest, friendly.
- Make other people feel important.
- Count your assets.
- Meet the other person at his or her own level.
- Keep a cheerful disposition to work.
- Keep moving.
- Keep trying.
- Give the gift of heart.
- Get off to a good start in anything you do.
- Forgive yourself if you fail.
- Be lavish with kindness.
- Influence people with your charm, not your power.
- Keep your promises.
- Be an optimist.
- Keep your temper to yourself.

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